

COAL AGE

A MCGRAW-HILL PUBLICATION

SEPTEMBER, 1958

Nuclear Power—How Close? p 70

Visual Tension Indicators . . p 80

Aerial Maps in Stripping . . p 112

PRICE \$1



Slope Hoisting With the Cable Belt . . . p 106

MSA's continuous MinePhone research and development assures dependable underground communication in mines and areas previously thought inaccessible for this type of equipment.

Built-in →
quality here



increases safety and dependability here



The motorman has clear, instant voice communication with the dispatcher or other motormen while trips are moving.

M-S-A's MinePhone helps mine operators gain and maintain fast, high-capacity haulage schedules

Briefly, here's how the M-S-A® MinePhone helps keep haulage schedules abreast of production in today's mechanized mines.

The MinePhone coordinates trip traffic for safe, fast, productive haulage control. Trip control avoids excessive power loads for economical operation. Assures better distribution of cars for peak loading efficiency.

Further, a MinePhone system reduces frequency of motormen and trip riders getting on and off trips. This saves time. Minimizes chances of injury. Reduces wear and tear on

haulage equipment caused by excessive stopping and starting.

Finally, the MinePhone speeds up operations of maintenance crews. Provides an efficient, time-saving underground call system. Keeps main line haulageways free of time-consuming traffic tie-ups.

Your MSA representative would be pleased to arrange a demonstration for you. Call him in for an evaluation of your communication needs. And write us for informative literature on the MinePhone.

MINE SAFETY APPLIANCES COMPANY

201 North Brodbeck Avenue, Pittsburgh 8, Pennsylvania

MINE SAFETY APPLIANCES CO. OF CANADA, LTD.

Toronto, Calgary, Edmonton, Montreal, Sydney, Vancouver, Winnipeg



B.F. Goodrich



Mine gets added safety, no spillage with flexible, fire-resisting belt

THERE'S no fuel for fire in the rubber of that conveyor belt. It will not support combustion or spread fire because it's a B.F. Goodrich belt made with fire-resisting rubber.

The special rubber used in this B.F. Goodrich belt also has high resistance to impact, abrasion, oil, grease, tearing, cutting, gouging and even mildew attack. As a result, a B.F. Goodrich belt made with fire-resisting rubber can be expected to equal—or surpass—the long service records made by

other B.F. Goodrich Caricoal belts in underground mines.

Natural troughing is the reason why this B.F. Goodrich belt works well on a rope conveyor, and so lasts longer, reduces coal-handling costs. Because it's so flexible, it holds its cupped shape whether empty, lightly or fully loaded.

In states where ventilation stoppings are required if fire-resisting belts are not used, B.F. Goodrich fire-resisting belts eliminate costly protective walls,

save mines thousands of dollars each year. B.F. Goodrich belts made of fire-resisting rubber have been accepted for listing as fire-resistant by the Bureau of Mines (Acceptance No. 28-6).

Before you buy another conveyor belt, look into the cost-cutting advantages and safety you can get with a B.F. Goodrich fire-resisting belt. Your B.F. Goodrich distributor can give you full details, or write *B.F. Goodrich Industrial Products Company, Dept. M-401, Akron 18, Ohio.*

B.F. Goodrich *industrial products*



You can get significant dividends
in maintenance savings by using a...

Texaco Simplified Lubrication Plan

Plan can reduce lubricant inventory and improve lubrication. It can mean more productive man-hours, less repair costs, less time lost.

If you are using more than six lubricants for your major lubricating jobs, chances are your maintenance costs are a lot higher than they should be. Storage problems, handling costs, and the dangers of misapplication are often costly results of stocking more lubricants than you need.

Texaco Plan cuts number of lubricants needed. Specifically tailored to your operation by your local Texaco Lubrication Engineer, this new plan can cut your requirements down to no more than *six* lubricants for *all* your major maintenance needs. Yet the Plan is simple to put into action; it's quick; and above all, it can save you a significant amount of money.

How the Texaco Plan works. The Texaco Simplified Lubrication Plan is based on a proven



combination of multi-purpose and specialty lubricants—varied to meet your particular requirements. For example, Texaco Multifak might be recommended because this versatile lubricant will serve effectively on practically any grease job. It “stays put” in the most severe service, and gives excellent protection against contamination and corrosion, through a wide temperature range. For solving special problems, like lubricating track rolls for example, your Texaco Lubrication Engineer will recommend a specialized product like Texaco Track Roll Lubricant. And so on. Your Texaco Lubrication Engineer is well qualified to insure that each of your lubrication needs will get the best in modern lubrication with the minimum number of lubricants.

Get the full details. Your local Texaco Lubrication Engineer can give you complete information on the *Simplified Lubrication Plan*. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street,
New York 17, N. Y.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

COAL

Here is a better, lower cost way
to dewater MINUS 28 MESH coal



You can lick this tough job with the *Bird Solid Bowl Centrifugal*.

Centrifugal force takes out *more water at less cost* than vacuum or gravity.

Dewater those coal fines, from thickeners or cyclones, with this BIRD and get:

- 5 to 15% lower moisture
- selective separation of high ash fines or clays
- uniform results regardless of variations in feed
- low maintenance expense

Ask us to show you what the Bird Centrifugal can do on *your* minus 28 mesh coal.

BIRD
MACHINE COMPANY

SOUTH WALPOLE, MASSACHUSETTS

Regional Offices: EVANSTON, ILLINOIS • PORTLAND, OREGON

This Month in

SEPTEMBER 1958

Features This Month:

Editorial—For Growth and Profits	p 71
Nuclear Power Costs Today and Tomorrow	p 70
How Visual Tension Indicators Improve Bolting	p 80
Hydraulicking and Scraping Remove Overburden	p 86
Safety Features in Designing Ireland Mine	p 92
The Facts About Draw	p 98
Hoisting With the Princess Cable Belt	p 106
How Hanna Uses Aerial Surveys	p 112
Economics of Pipeline Gas From Coal	p 116

Departments This Month:

Coal Commentator	p 11	News Roundup	p 26
Foremen's Forum	p 126	Operating Ideas	p 130
Equipment Developments	p 134		

NEXT MONTH—OCTOBER SPECIAL

PLAN 59 *Modernize now
for growth and profits*

A SPECIAL REPORT FROM MCGRAW-HILL TO AMERICA'S BUSINESS EXECUTIVES

The whys, hows and benefits of modernization:
Basic Approach . . . Cost Control . . . Deep
Mining . . . Strip Mining . . . Services . . .
Preparation . . . Safety

► Competition

*Nuclear Power Costs Today
and Tomorrow p 70*

Dr. Harlan W. Nelson, Battelle Memorial Institute,
Columbus, Ohio.

The economics of a nuclear system can be put on a firm basis only when operating data from commercial-size plants is available. This stage of development has not yet been reached in the U. S. although Great Britain and Europe are moving nearer to it. Cost reductions are necessary but are not likely to lower monthly bills since fuel makes up only about 15% of the delivered cost of electric power. Few believe that the U. S. will need nuclear power in the next 10 to 20 yr.

Along the Way—Nuclear power costs in U. S., Britain, Euratom countries; nuclear fuel cycles from ore to reactor and back.

COAL AGE • September, 1958

COAL AGE

► Roof Support

*How Visual Tension Indicators
Improve Roof Support with Bolts p 80*

R. A. Gardner, Chief Industrial Engineer, New River & Pocahontas Consolidated Coal Co., Caples, W. Va.

Major improvements in roof bolting with visual tension indicators have been confirmed by a formal test program showing that indicators will satisfactorily indicate proper bolt tension at the time of installation and also loosening or excessive loading of bolts after installation. One indicator installed in every other row of bolts is sufficient in most cases.

Highlights—Table of torque-tension relationship of indicators; maps and photos showing effects of bolting when indicators are used and when they are not.

► Stripping

*Hydraulicking and Scraping
Remove Overburden at Arctic Coal p 86*

Subbituminous seam averaging 40 ft at Lignite, Alaska, is uncovered by bulldozing off trees and moss, hydraulicking sand and gravel mixture (200 cu yd per hour per giant), and removing clay with scrapers—working in from outcrop of coal pitching 10 to 15 deg. The coal is drilled with sidewall-type overburden machine and is loaded with shovel and front-end equipment.

In Addition—Bed thicknesses, reserves and coal characteristics.

► Deep Mining

*Safety Features in the Design and
Development of Ireland Mine p 92*

G. W. McCaa, General Manager, Hanna Coal Co., Div. of Consolidation Coal Co., Moundsville, W. Va.

Roof safety at Ireland mine is improved through the use of "satellite" roof-bolting drills mounted on boring.
(Continued on p 7)

COAL AGE, September 1958, Vol. 62, No. 9, Published monthly on the 1st by McGraw-Hill Publishing Co., Inc. Publication office, Third & Hunting Park Ave., Philadelphia 66, Pa. United States subscription rate for individuals in the field of the publication \$3 per year; single copies \$1. Second class mailing privileges authorized at Philadelphia, Pa. For additional information see p. 11.
Postmaster: Please send Form 3579 to Coal Age, 330 W. 42d St., New York 36, N. Y.

3 new applications get longer life and minimum maintenance using Dodge pillow blocks with Timken® bearings

PICTURED below are three applications where Timken bearing equipped Dodge pillow blocks stay on the job with little attention under tough conditions. Their tapered design lets Timken® bearings take both radial and thrust loads in any combination. And full-line contact between rollers and races provides extra load-carrying capacity. Wear is reduced, maintenance is cut to the minimum.

Cutaway view shows the Dodge

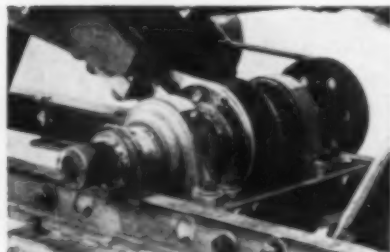
All-Steel pillow block with Timken bearing mounting. Of special design, the bearing has a tapered bore with self-aligning spherical outer surface—never needs adjustment.

Besides the All-Steel pillow block, other versatile Dodge pillow blocks with Timken tapered roller bearings are: Type "E", Double-Interlock, Type "C" and Special Duty. All are compact in design. Special thrust devices that take up extra space are not needed.

And to get the finest steel for Timken bearings, we make it ourselves—America's only bearing manufacturer that does. So specify bearings trademarked "TIMKEN" for the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



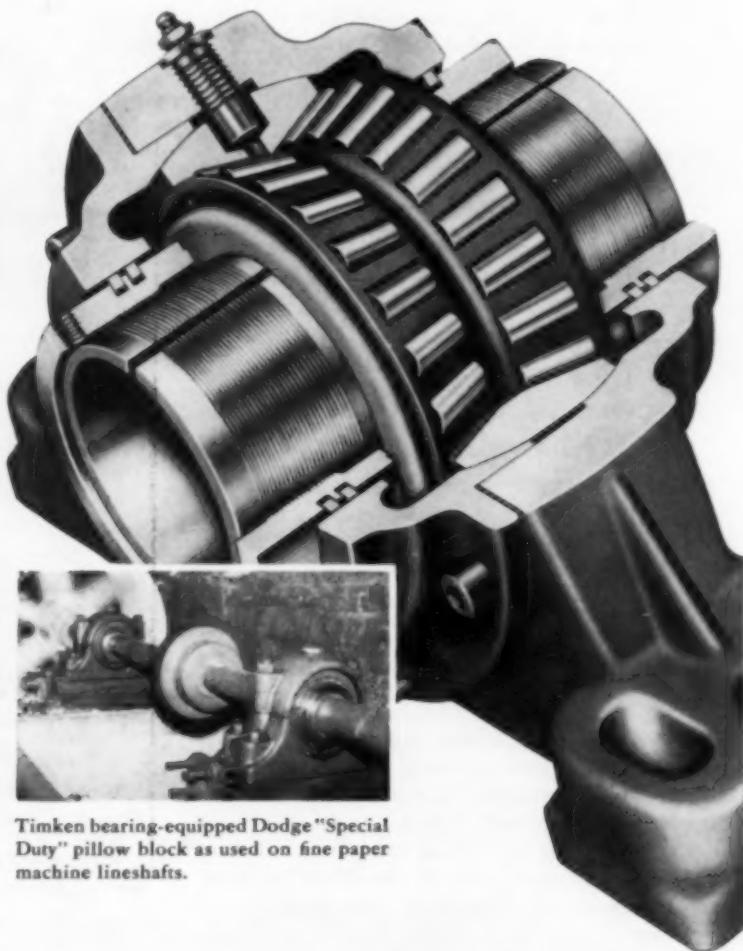
This symbol on a product means its bearings are the best.



Timken bearing-equipped Dodge All-Steel pillow block used in a vibrating conveyor.



Timken bearing-equipped Dodge Type "E" pillow block used in sand and gravel plant.



Timken bearing-equipped Dodge "Special Duty" pillow block as used on fine paper machine lineshafts.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS ROLL THE LOAD

September, 1958 • COAL AGE

HEAVY - RUBBED - POWERFUL

type mining machines. Main openings with an extended life are top-brushed to a strata of coal above the Pittsburgh No. 8 drawslate. The roof coal is bolted, covered with wire mesh and gunited to provide long-term support. Development and pillaring plans have been designed to insure safety and contribute to maximum recovery. Pillars (64x64 ft) are split both ways, leaving four supporting blocks. All equipment, except haulage, is powered by AC. Primary underground voltage is 6.9 kv.

Idea Starter—Three continuous-mining units in a single panel provide for fastest possible extraction.

► Roof Action

The Facts About Draw p 98

A. W. Hesse, Consulting Engineer, Waynesburg, Pa.

The draw concept, which goes back half a century or more, holds that when overburden breaks the breaks slant over the solid coal at 8 to 15 deg. Draws may occur, but not in this fashion. One reason is the nature of the rock, which should cantilever rather than break back. Well failures and the manner of their occurrence also indicate that vertical or horizontal shifting of the burden resulting from pillar failure is the cause of such failures, rather than draw.

Conclusion—"Draw" takes place but is a result of movement of surface material rather than of action that starts at the coal level.

► Slope Hoisting

Three Years of Hoisting

With the Princess Cable Belt p 106

New slope sunk to replace old shaft hoist and permit raising mine capacity. Three conventional conveyors originally planned for the 3,800-ft distance with vertical lift of 693 ft, but investigation resulted in choice of one cable belt for the entire lift. Wire ropes carry and move the single-ply belt. With a 550-hp drive, peak capacity at 400 fpm is 750 tph.

Special—Picture story of how the cable belt works.

► Stripping

How Hanna Uses Aerial Surveys p 112

Initial use of aerial surveying at Hanna stripping properties was in 1948 for the production of topographic maps. Besides contour maps and the stereoscopic studies they make possible, aerial photos can be assembled into photomosaics, making good reconnaissance maps. In addition to other uses, Hanna now is employing aerial mapping for quick determination of yardage figures in cost control. Other map uses are laying out access road

(Continued on p 9)

This Month in COAL

DEFINITELY UP—Developments in August made it clear that the economy has turned the corner and is on the upward road again. The stock market, incidentally, concurs. Thus, the question becomes one of how fast the pickup will be in the immediate future. The answer? As of the moment, some increase but no great surge before the end of the year, barring a major scare or the actual outbreak of fighting in the Middle East or elsewhere in the world.

Steel is still well under a 75% operating rate, and no boom in demand is expected before Dec. 31 unless there is an emergency. The situation is much the same in other bellwether industries. The picture to the end of the year, therefore, is one of unspectacular but definite improvement, with only a remote chance for a big stepup in the pace of operations from the levels of recent months.

TAKEOFF IN '59?—Will improvement continue at a modest rate in 1959 or will there be a takeoff on another boom ranging from mild to robust? Some argue for the takeoff, basing their contentions on, among other things, the latent demand for motor vehicles growing out of the low rate of sales in 1958, increasing rate of junking as a result of greater age, and a continued high rate of family formation. The opposition, while conceding the existence of such a latent demand, holds that it alone, or in combination with certain other potentials, cannot generate a boom in 1959, though it might in 1960 or later. But there are no visible exceptions at the moment to the general conclusion that business will continue its late 1958 improvement in the year 1959.

AHEAD IN COAL—The fact that business definitely is on the uptrend makes it more likely that the most recent forecast for bituminous production in 1958—430 million tons—will pan out. Confirmation is found in the strengthening of the weekly rate to close to 9 million tons, with the prospect that it will go well over 9 million for at least part of the fourth quarter—and perhaps to 10 million or better in some weeks. The present forecast for 1959 is 510 million, and there is reason to believe that it can be realized if business hits a good pace next year.

Anthracite also was firming up as the industry approached the fourth quarter, though weather remains the big unknown. With a reasonable break, hard coal should pick up some of its losses so far in 1958, and should go into 1959 in better position.

RECESSION IN EUROPE?—Now that the United States is working out of its depression, there is some opinion that western Europe may pass from its present mild decline into a depression of its own later this year or early in 1959. If this should happen—and the "if" is a sizeable one—the recovery in U. S. exports of coal would be postponed for at least a time. Even without a recession, exports will continue to experience some additional difficulties arising out of heavy stocks and further recovery in the coal production rate abroad. Basically, however, there is no change in the conclusion that Europe will continue to need shipments at or near the past magnitude, if not greater, for some years to come.

HEAVY - RUGGED - POWERFUL



**LOWEST COST PER TON WITH
McCARTHY AUGER DRILLS**

**LIVE POWER • RAPID TRAVERSE
SKIDS MOVE SIDWAYS, FORWARD
AND BACK • SAFETY AUGER GUIDE
EASY COUPLING PINS**

COAL RECOVERY DRILL

"Walks" from hole to hole to auger high quality coal

An Ohio miner removes 550 tons of coal in each 8-hour working day with this Model 15 36-42x12" McCarthy drill, operated by two men. He drills 42" dia. holes 144' deep. Auxiliary conveyor eliminates spillage at hole. It operates on either side of drill for working blind cut. Twelve different models of McCarthy Coal Recovery Drills mine low-cost "bonus coal"

Manufacturers of Drilling Equipment Since 1901



THE SALEM TOOL COMPANY

763 SOUTH ELLSWORTH AVE. — SALEM, OHIO, U. S. A.



**VERTICAL
MODEL 106-24**

**World's Fastest Heavy-Duty
Vertical Auger Drill**

Bores faster, deeper, larger dia. holes than any other auger drill. New gear reduction unit slows auger rotation for operation in hard rock formations. Drills 8" and 9" dia. holes readily in shale and sandstone formations, drills larger dia. holes up to 24" dia. in softer formations.

**HORIZONTAL
MODEL 104**

**Lowest Drilling Costs per
Foot, Self-Propelled or
Truck-Mounted**

Bores up to 12" dia. holes to 150' depth faster, cheaper than any other horizontal drill. Requires less working space, saves many man-hours... operates easily in tight, hard-to-reach locations.



FINGER-TIP CONTROL



**Gives Desired
Rotating Speed
of Auger**

HYDRAULIC FEED



**Provides Any Speed
up to 6 Feet per
Minute Horizontal
Feed of Drill**

This Month in Coal Age—Cont'd

and service and communication lines, plotting boreholes, and estimating coal tonnage and timber reserves.

Cost and Accuracy—Cost about half that of conventional surveying; accuracy as good or better.

► Coal Gasification

The Economic Outlook for

Pipeline Gas From Coal p 116

Sidney Katell, Branch of Coal Gasification, U. S. Bureau of Mines, Morgantown, W. Va.

Minimum size of plant selected for economic study has capacity of 90 million cu ft per day. Four processes studied. Capital requirements range from \$95 down to \$80 million. Cost of gas with 12% gross return on investment ranges from \$1.13 down to \$0.84 MCF.

Possibility—Processes now available would permit building plant in area that would take over 90 million cu ft daily and would pay over \$1 per MCF.

CARL COASH, Publisher

IVAN A. GIVEN, Editor

Harold Davis
Managing Editor

A. E. Flowers
Associate Editor

W. A. Raleigh Jr.
Associate Editor

Daniel Jackson Jr.
Assistant Editor

F. A. Zimmerli
Art Director

G. B. Bryant Jr.
Washington

W. H. McNeal
Circulation Manager

Raymond H. Smalley
Business Manager



Member of Associated Business Publications
and Audit Bureau of Circulations

NEWS BUREAU OFFICES:
Atlanta 3; Cleveland 15; Detroit
26; Houston 26; San Francisco
4; Washington 4.

WORLD NEWS OFFICES
London, Paris, Bonn, Tokyo,
Bombay, Rio de Janeiro, Mexico
City.

COAL AGE, VOLUME 63

September, 1958, NUMBER 9

COAL AGE, with which are consolidated *The Colliery Engineer and Mines and Minerals*, is published monthly on the 1st by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948) Founder. PUBLICATION OFFICE, Third & Hunting Park Ave., Philadelphia 46, Pa. See box below for directions regarding subscriptions and change of address.

EXECUTIVE EDITORIAL, CIRCULATION AND ADVERTISING OFFICES, 1221 West 45th St., New York 36, N. Y. Donald C. McGraw, president; Joseph A. Gerardi, executive vice president; L. Keith Goodrich, vice president and treasurer; John J. Cooke, secretary; Nelson Bond, executive vice president, Publications Division; Ralph B. Smith, vice president and editorial director; Joseph H. Allen, vice president and director of advertising sales; A. B. Venezian, vice president and circulation coordinator.

Subscription are solicited only from executives, management, engineering, operating and supervisory officials associated with companies engaged in the mining and preparation of anthracite, bituminous and lignite coal. Position and company connection must be indicated on the subscription orders. Send to address shown in the box below.

U. S. and possessions and Canada, subscription rate for individuals in the field of the publication \$3 per year, single copies \$1; elsewhere \$15 per year, payable in advance. Single copies \$1. Second-class mail privileges authorized at Philadelphia, Pa. Printed in the U. S. A. Title registered in U. S. Patent Office. © Copyright 1958 McGraw-Hill Publishing Co., Inc. All rights reserved. Our primary aim is to provide subscribers with a useful and valuable publication. Your comments and suggestions for improvement are encouraged and will be most welcome. The publisher, upon direct request from any subscriber to our New York office, agrees to refund the part of the subscription price applying to copies not yet mailed.

COAL AGE articles are indexed by Engineering Index. Coal Age's own index is published annually in the December issue.

SUBSCRIPTIONS: Send subscription correspondence and change of address to Fulfillment Manager, COAL AGE, 330 West 42d St., New York 36, N. Y. Subscribers should notify Fulfillment Manager promptly of any change of address, giving old as well as new address and including postal zone number, if any (official post office request). If possible, enclose an address label from a recent issue of the magazine. Since copies are addressed one to two issues in advance, please allow one month for change to become effective.

COAL AGE • September, 1958

This Month in Mining Practice

TOP SLICING—More and more thought is being given to ways of mining vertical or nearly vertical seams. As a result, what might be called top slicing is growing and is being conducted in more and more instances "under roof."

Basically, top slicing is advancing a cut across the vein from one vertical or slant opening to another, starting a new one when the old is completed. The "roofs" are of several types. At the Bonanza (Utah) gilsonite mines they are fixed structures of planks laid on cross timbers and left in place, with a new roof being built after a specified interval of advance down the pitch. In Russia, some mines use a flexible type of roof which is dropped after each lift is completed. Whatever the loading system—hand or otherwise—reports indicate a major increase in efficiency.

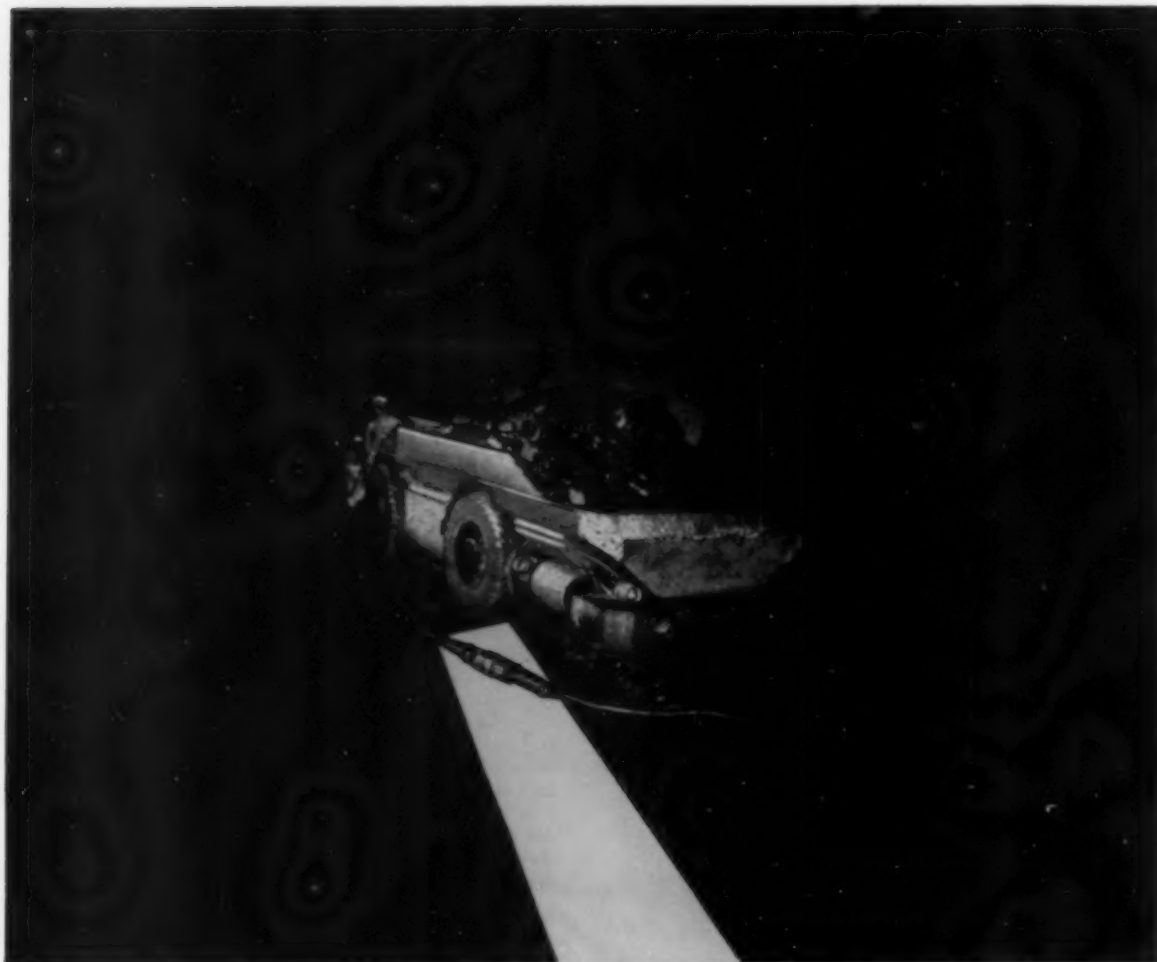
NEW ROOTING HORIZONS—Rooting is almost as old as the first bulldozers. Until recently, applications were rather limited because of the low horsepower of the tractors. The big machines of today, however, have taken the rooter into, first, breaking coal for loading and next into certain elements of the stripping cycle. Where a layer of shale lies directly on the coal, as an example, some operators, rather than go to auxiliary drilling and shooting or have the stripper struggle without supplementary shooting, now break it up by ripping. As another example, heavy bands or middlemen between benches frequently can be ripped to materially speed final removal. And so on.

GOOD MATCH—Is it likely that present preparation standards will change radically in the near future? Based on plants and equipment now being contracted for the answer is "No." Plain water, or water with magnetite or other means of raising density, continues to handle the bulk of the tonnage cleaned. Thus, except for the rise in fine-coal treatment and water clarification, the preparation pattern for the next few years is one of stability in basic approach and equipment, reflecting good matching with consumer needs.

GROWING ITEMS—Announcement from time to time of new equipment is evidence that systems for remote control of fans, pumps and substations, for blending coal by automatic control, and for other applications, is doing a job for coal. The big returns are in reduced manpower. In addition, such systems accomplish such things as automatic feed proportioning with a precision that no manual control can approach.

In store: Wider and wider use of such systems.

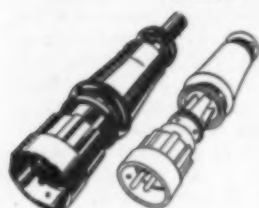
ROCK MECHANICS—Outside of supplying supports very little has been done up to now about the problem of roof rock in deep mining. This situation, however, is beginning to change, and a variety of investigations are being conducted into the makeup of roof rock and how it acts. The latest is the cooperative program on rock mechanics established by Imperial Coal and Penn State. With improved supports and improved strengthening methods, such research will hasten the day when accidental roof falls will reach the absolute minimum.



THIS CONNECTOR HAS TO BE *Tough!*



STRAIGHT PIN BIGUN (SPB) styles are molded to 36" (Or as specified) leads. Have threaded metal couplings. Ask for Bulletin B39a.



"QUIK-LOC" styles attach quickly to your cable. New-type couplings engage or disengage in 1/4 turn. Ask for Bulletin B57.

IT IS! It's a Joy Connector... a non-corrodible, moisture-tight electrical coupling with a rugged coat of flame-resistant, shatter-proof, distortion-resistant Neoprene. Soak it in water, hit it with a sledge, drag it through oil... it'll take that and more.

Joy plugs and receptacles are built for long, maintenance-free service under the most adverse conditions. They're produced in styles and sizes to meet every need... for both AC and DC applications. "SPB" and "Quik-Loc" designs are available with pilot control contacts for *permissible* operation with Joy's Bureau-of-Mines-Approved distribution centers (SCC units).

For details, write Joy Manufacturing Company, Electrical Products Division, 1201 Macklind Avenue, St. Louis 10, Missouri. Executive Offices: Oliver Building, Pittsburgh 22, Pennsylvania.

JOY ... EQUIPMENT FOR MINING ... FOR ALL INDUSTRY

**OTHER
PRODUCTS
of the
ELECTRICAL
PRODUCTS
DIVISION**



Safety
Circuit Centers



Distribution
Boxes



Portable
Lighting



Cable
Vulcanizers

The Coal Commentator

Money Minutes

Pay for not producing, though it is now embalmed in federal agricultural policy, still is not the road to the low cost a coal mine needs to stay in business and make a profit.

Theoretically, it is possible to set things up in a production unit so that it is never necessary to pay for an idle minute. Actually, this can never be attained in practice, but it is no reason for not concentrating on idle time. Unless concrete steps are taken to reduce it, there usually is a great deal of unnecessary idle time in a production cycle and a lot of it is critical time which limits the production of the unit—sometimes drastically.

What can be done? Answer: Study the cycle thoroughly in accordance with industrial-engineering principles. Wherever a man or a machine, particularly a loader or miner, has to wait on another man or machine concentrate attention there. Reshuffle the cycle and crew duties to eliminate the wait or get it down to the absolute minimum.

The payoff? Normally a reduction of 20 to 25% in face cost—and sometimes 40% or more.

Britain Too

The unhappiness of coal producers in the United States over oil imports is shared by producers in certain other countries also. The list now includes Great Britain, where there is a rising tide of debate over that nation's program of stimulation of oil use resulting from the fact that until recently the coal industry was unable to meet demand.

Now, the coal pinch has eased in Great Britain—at least temporarily—and restrictions on household use have been lifted, with restrictions on industrial consumption scheduled for early removal also. In addition, developments in the Near East have resulted, as in the U. S., in doubts as to the wisdom of excessive reliance on foreign oil to the detriment of the producing capacity of the coal industry.

Britain too seems to be in for a growing hassle over oil imports, and its addition to the ranks of those taking a hard look at fuel policy may help achieve an earlier solution elsewhere—specifically in the U. S.

Air Also

ORSANCO, meaning the Ohio River Valley Water Sanitation Commission, is becoming a fairly well-known abbreviation in coal mining as a result of its operations in the abatement of stream pollution. Now, we have another organization—the Ohio Valley Air Pollution Control Council, Inc., of Wheeling, W. Va., which is presently soliciting membership. From this, it will be easily gathered that the

council is a private organization and not a governmental authority with full police powers like ORSANCO.

OVAP has as its objectives development of research programs, the providing of engineering assistance in control of air pollution, the advising of communities on control ordinances and, eventually, the providing of administrative, engineering and control services (excluding actual enforcement) under contract.

Note to coal men: Organization of OVAP is one more indication that pollution of all types must be included in planning mining operations and sales in the future.

AC Addition

A new mine of the Ayrshire Collieries Corp., near Terre Haute, Ind., is the most recent example of the growing trend toward AC underground.

Face equipment at this new property will operate on 440 V, with the primary supply at 5,000 V to portable underground distribution centers. One item making the system possible is a mainline belt. Distribution equipment and supplies, specified by L. E. Briscoe, Ayrshire electrical engineer, and supplied by Westinghouse, includes 300- and 225-kva nitrogen sealed power centers. Initial mine production is estimated at 1½ million tons annually.

The march to AC is on. The advantages supply the impetus, though there are a few problems. One is lack of standards in many areas. Another is out-of-date standards. And overall there is a lack of consistency in regulations and standards. The quicker the action in this field, the sooner AC will be free to make its maximum contribution to safety and efficiency.

Not So Rare

A coal burner in a new \$30,000 custom-built house these days is a rarity almost in the same class with Hope diamonds. But the fact that it has been done, and plans have been laid for additional installations in the same development, is indication that the rarity could become less so in the future.

Location: Worcester, Mass. Builder: Alfred A. DeFalco. Unit: 130M Anthratube. Coal requirements: 6½ tons of pea per season, 8-room house, including hot water. Saving: \$90 a season over the next lowest-priced automatic fuel, with complete automaticity and cleanliness.

Anthracite has lived hard for many years but it has not given up. In fact, its program for holding and building markets is practical and hard-hitting. That it is getting results is evidenced by such developments as Builder DeFalco's choice of hard coal for economy and convenience.

NOW - with S-D Automatic Overlapping End Cars... Here is Automatic Loading and Dumping



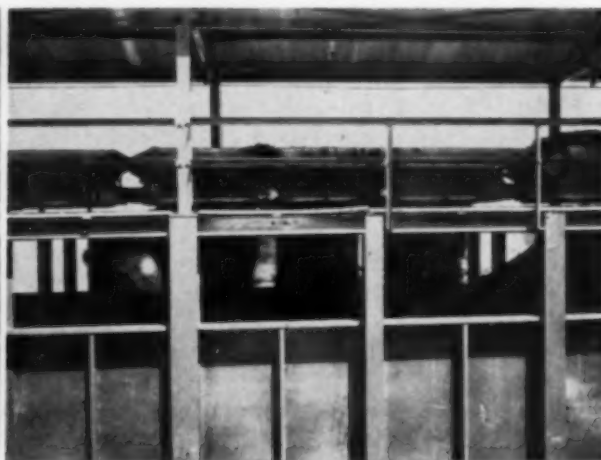
SOUTH-EAST COAL COMPANY'S Camp Branch, Ky., mine is an impressive example of alert, hustling management and operating personnel. Only a few machines and men are required for this simple, organized operation. Above you see the tippie and coal storage bin. Conveyor runs continuously hauling coal from bin to tippie. Bin provides surge capacity to permit successive dumping of long trips. Only 2 men are needed at these facilities.



SLATE BIN is located a few hundred feet from Coal Storage Bin. The small bin in picture above provides track ballast. The same S-D Automatics that haul coal also haul out the top and bottom rock to Slate Bin. S-D "Automatic" Overlapping End Cars more than meet South-East's planned program for haulage at absolute minimum cost! Not only can a single trip of S-D Overlapping End Cars be loaded continuously and dumped one-after-another without stopping, but they provide maximum haulage safety! Automatic couplers eliminated accidents, fingers, hands, arms, no longer have reason to be between cars, nor can a man get between cars after coupling!



Here you see trip of S-D Automatic Overlapping End Cars as it enters bin. Conveyor under track hauls coal from bin to tippie.



Close-up above of S-D Automatic Bottom Dumping Cars was made while trip was dumping. You can see bottom dumping doors actually down and the coal discharging.

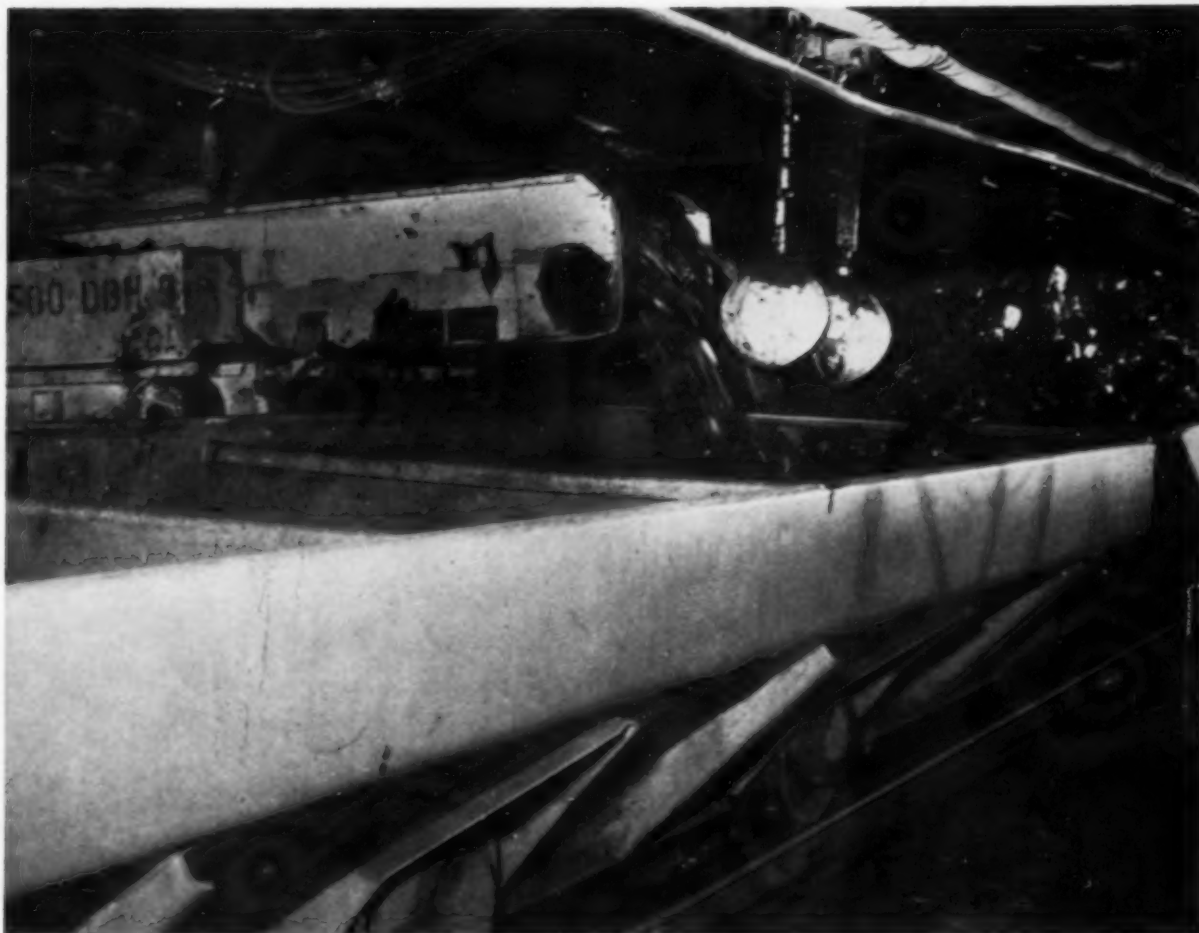


TWENTY-NINE MEN, including Mr. Chester Cureton, day-shift foreman, pictured above, and Mr. T. B. Smith, night-shift foreman, operate one continuous miner two shifts at this mine. At present, operations consist of driving and grading a main line heading a distance of some 27,000 feet. In early 1960, additional sections will bring this mine to its designed capacity of 5,000 tons per day with no change in the basic haulage system.

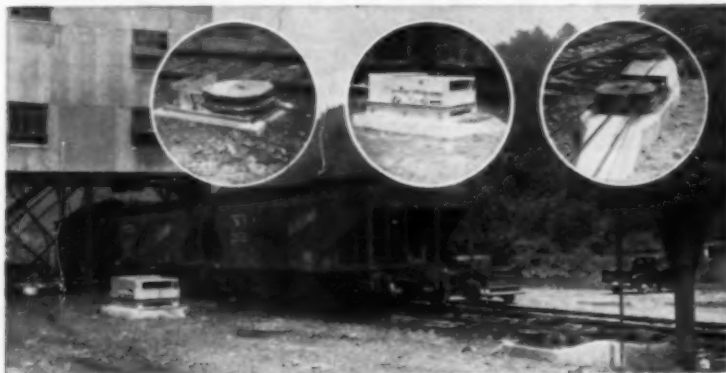


This S-D Automatic Haulage System operates with minimum manpower requirements. The motor crew not only handles all haulage, but checks the performance of the manless automatic loading station. Clinton Fleming, above, is day-shift motorman. Earl Adams is motorman on night shift. These men are in charge of the system and make it tick like clockwork, leaving a trip of 10 to 16 empties to be loaded and hauling out a pre-loaded trip of 10 to 15 cars.

...and Maximum Haulage Safety!



Here you see untouched action photograph showing why and how S-D Automatic Overlapping End Cars are loaded continuously one-after-another at South-East. Note coal coming off conveyor. See how portion of coal is finishing-up loading forward car while the other portion is starting to load empty car. (Trip was caught in movement while overlapping ends were directly under conveyor). Switches operated by ball movement activate hydraulic spotter which moves trip.



S-D "BROWNE" Double-Rope Hoist moves railroad cars under loading chute at tipple.

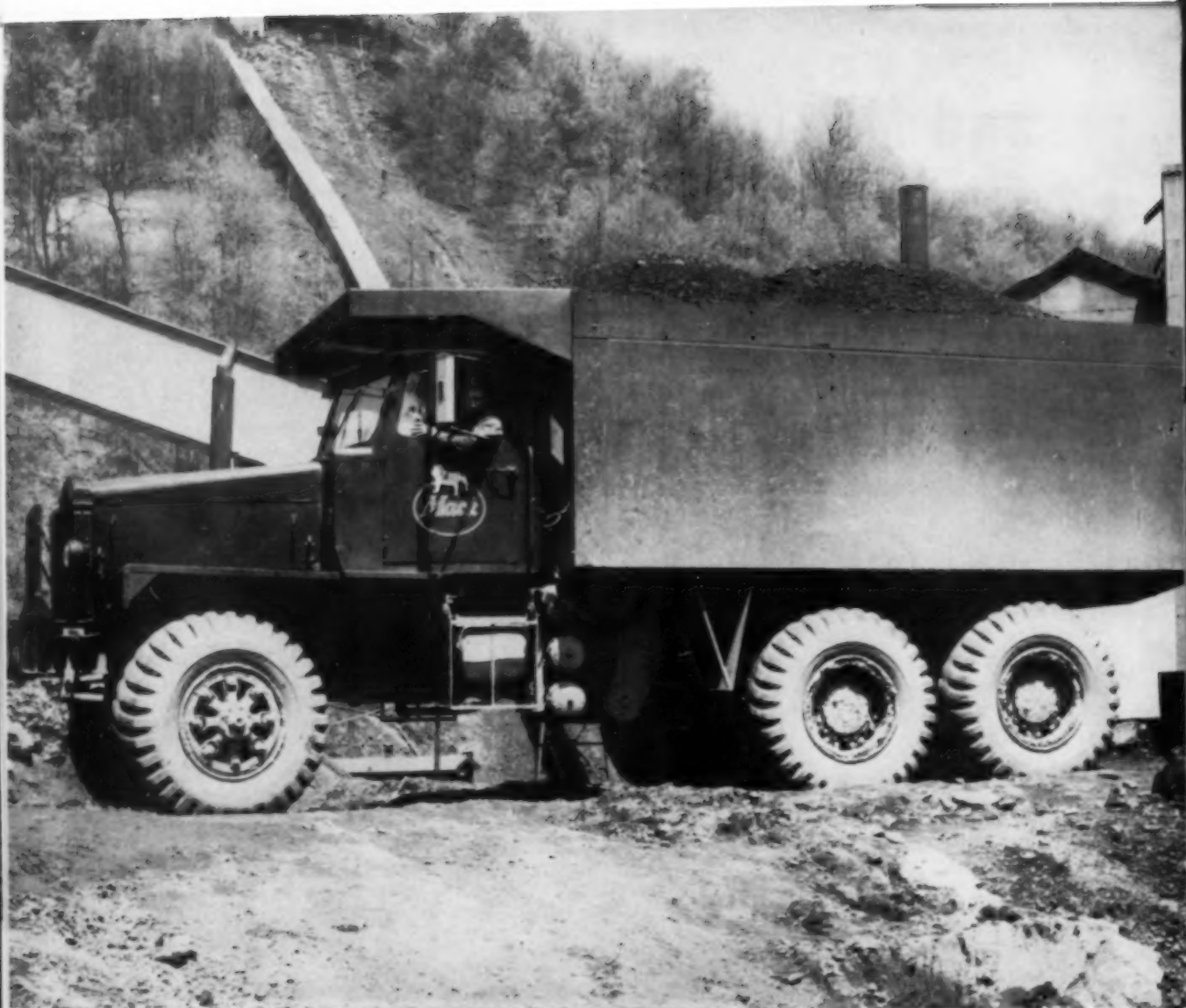
SANFORD-DAY

KNOXVILLE, TENNESSEE

- S-D Mine Cars, all types and kinds.
- Precision S-D Mine Wheels.
- Tough, year-after-year wheel service by special S-D wheel Hard-Facing Process (this can really save you money and eliminate downtime).
- S-D "Browne" Hoists.
- S-D Car Spotters, all types, including special drop bottom car spotters.
- S-D Mine Shovels and Boilers.
- S-D Automatic Loading Stations for Mine Car and Railroad Car Loading points.
- S-D Slusher-Trains for mining and construction industries.
- S-D Gismo and Transloaders for mining and construction industries.

This is an Actual Operation Picture-Report on the performance of S-D Automatic Overlapping End Cars. Savings provided by these cars are tremendous! One large mine recently converted its big Rotary Dump operation into a similar open track bin to realize the automatic-loading and automatic-dumping savings obtained only by S-D Automatic Overlapping End Cars. Every S-D Automatic Overlapping End Car installation is earning major savings! We have movies showing these cars, large and small, in regular mine haulage. May we show them to you? Write us today.

SANFORD-DAY IRON WORKS, INC., KNOXVILLE, TENN.



For heavy-duty hauling... count on Mack

Strip mining of coal demands the best in hauling equipment, and Mack has everything it takes for dependable, profitable operation: ability to haul maximum payloads with low operating costs; maneuverability and ease of handling for fast spotting and dumping; minimum down time and only routine maintenance requirements, and a comfortable, roomy cab assuring all-day driver ease. These characteristics have convinced progressive operators the world over that—under today's operating conditions—they

can't afford *not* to operate Macks. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS



for profitable auger mining

COMPTON COAL

Augers... *increase*

coal recovery 12% to 65%



1

COMPTON "SINGLE HEAD" AUGERS for high seams

Compton "Single Head" Augers are available in four models with head sizes 28" to 52".



2

COMPTON "TWIN-HEAD" AUGERS for thinner seams

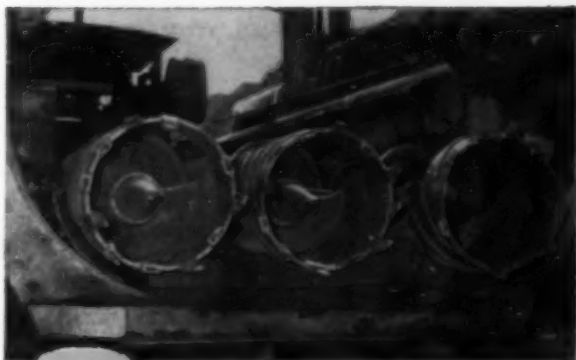
Compton "Twin-Head" Augers provide profitable thin-seam production. Available with head sizes 24" to 32".

The Compton line of single and multiple-head coal augers pave the way for maximum coal recovery regardless of your seam sizes and conditions. Together with other highly desirable features, the Compton patented non-clogging lump recovery head cuts coal at a high speed . . . provides maximum recovery in record time.

Call Compton today! Learn how planned auger mining with Compton Augers will lead to handsome profits through maximum recovery!

Compton, Inc.
ORIGINATORS OF COMPTON LUMP RECOVERY HEADS

BOX 1946 • PHONE, MAIN 4-6383 • CLARKSBURG, W. VA.



3

COMPTON "TRIPLE-HEAD" AUGERS for seams as thin as 24"

New Compton "Triple-Head" Auger delivers profitable tonnage from extra thin seams. Available with head sizes 16" to 22".

WHEN LOOKING FOR AUGERS—LOOK TO COMPTON

More tonnage . . . more profits

**50%
Higher
Tonnage
with the
new
CM37**



For medium and high seams



Backed by the tried and proven cutting principle of the original Lee-Norse Miners, the CM37 brings a new high in operational efficiency to continuous mining. This rugged

machine has more power, more capacity and higher tramming speed that results in increased tonnage per man shift.

Check these **NEW FEATURES!**

- 1 Total weight 25 tons—a 25% increase! Extra weight mostly in improved cutter head where it does the most good!
- 2 More power—fewer motors! Only 3 identical electric motors used . . . conservative continuous ratings . . . no water cooling.
- 3 Heavy duty electric control.
- 4 14" wide crawler treads with improved hydraulic motor and gearing.
- 5 24" wide conveyor driven by hydraulic gear motors applied directly to gathering head. Hydraulic start and stop . . . no clutch required.
- 6 Multiple tramming speeds—variable speeds to 50 feet per minute . . . fast tramming at 90-100 feet per minute.
- 7 Increased capacity...4 to 5 TONS PER MINUTE.

Coal high or low? . . .

...with *Lee-Norse* **MINERS**

For Low Coal...



LCM28

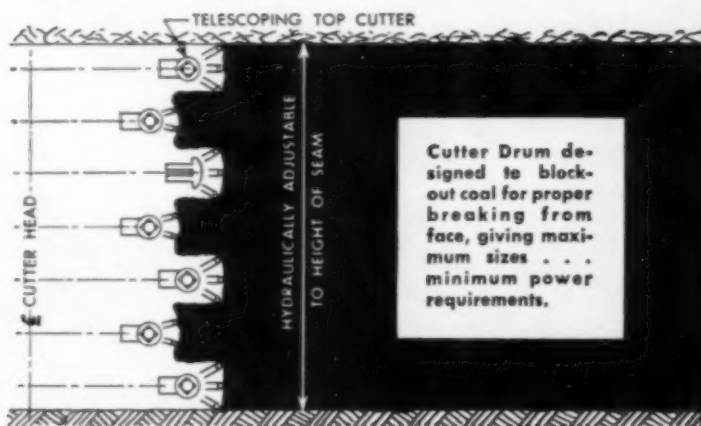
*ready for
production!*

For seams 30" to 48"

Here's how LCM28 produces profitable tonnage!

1. Weight 16 tons—rugged and heavy enough to cope with tough cutting conditions.
2. Capacity—2 to 3 tons per minute.
3. Hydraulically driven 24" flexible Conveyor.
4. Two Cutter Heads cut a wide face 16 feet or less.
5. Dual gathering arms have maximum reach of 11 feet... will gather ALL the coal regardless of position.
6. Controlled Trimming Speed gives proper sumping action and Dual Pump combination gives high trimming speed.
7. Especially good in cross-cut development!

The LCM28 "Low Coal" Miner employs a new combination of cutting and gathering coal. The vertical mounted extendable cutter drums arc together like a "clam shell."



All Lee-Norse Miners
are available in
AC or DC power.



Lee-Norse Company

CHARLEROI, PENNA.

Specialists in Coal Mining Equipment

Lee-Norse MINERS keep production on the go!

**KOEHRING
WORK
CAPACITY
in action...**



Mining phosphate — After stripping overburden from a deep vein, a Koehring® 605 dragline (left) loaded phosphate out of the narrow cut. On this type of operation, the big 605 can be used with 50 to 110 feet of boom — and handles $1\frac{1}{2}$ to $2\frac{1}{2}$ -cu. yd. dragline bucket, depending on weight of materials. (Check its other work capacities in chart on the next page.)



Heavy-duty 2-yard — Here is another Koehring size worth looking into — the 2-yard 805, with 25-foot deep-section shovel boom and $18\frac{1}{2}$ -foot dual dipper sticks. Fully convertible to clamshell for stockpiling, or dragline for stripping — handles 2 to 3-yard buckets on 50 to 150-foot boom. The 805 does your heavy lifting, too — safely handles loads up to 52 tons!



Introducing . . . the new 435

Now, Koehring brings you 35 tons of lift capacity, plus high-speed mobility on rubber, for lifting, material-handling, general utility and maintenance work around mines, quarries. It's the new 435 truck crane (shown above). Big, rugged — yet, is quickly convertible from fully-equipped crane to roadable machine for highway travel.



Quick facts on KOEHRING WORK CAPACITY:

ON RUBBER	MODEL	TYPE OF MOUNTING	CRANE LIFT CAPACITIES (Rubber-tired machines rated at 85% of tipping load.)	
	305	3-axle truck, or 21.5 mph Cruiser	30,000 lbs.	at 12-ft. radius
	385	3-axle truck, or 18 mph Cruiser	50,000 lbs.	at 12-ft. radius
	435	4-axle truck	75,000 lbs.	at 15-ft. radius
	545	4-axle truck	90,000 lbs.	at 15-ft. radius

ON CRAWLERS		Size shovel	CRANE LIFT CAPACITIES (Crawler ratings based on 75% of tipping load.)	
	205	1/2 Cu. Yd.	20,000 lbs.	at 10-ft. radius
	305	3/4 Cu. Yd.	30,000 lbs.	at 12-ft. radius
	405	1 Cu. Yd.	40,000 lbs.	at 12-ft. radius
	545	(Crane only — 85% rating)	90,000 lbs.	at 12-ft. radius
	605	1 1/2 Cu. Yds.	75,000 lbs.	at 12-ft. radius
	805	2 Cu. Yds.	100,000 lbs.	at 12-ft. radius
	1205	3 Cu. Yds.	150,000 lbs.	at 12-ft. radius

Extra lift capacity means . . . **MORE WORK CAPACITY WITH ALL ATTACHMENTS**

Dumping height: 40 feet-10 in. —

Owner of this strip mine needed a long-reach shovel — brought in a Koehring high-lift 1205, equipped with 2½-yard dipper on 50-foot boom. Working with boom at 45° angle, it has a cutting height of 51 feet-4 inches — and dumps at heights up to 40 feet-10 inches. This big 1205 is also available with 3-yard dipper on 40-foot high-lift boom — or as a standard 3-yard with 30-foot shovel boom for toughest digging. Its power, strength and load-stability as a shovel pay off in *extra work capacity* with all attachments. Takes 3 to 4-yard dragline or clamshell buckets on 60 to 170-foot boom — has 95-ton capacity as a lift crane (based on 75% rating). Koehring distributor has complete details on this, and other sizes. Call him today.

KOEHRING

DIVISION OF  **KOEHRING CO.**
Milwaukee 16, Wisconsin

Koehring excavators and cranes also manufactured in:
CANADA • ENGLAND • SPAIN • JAPAN

K607

new Bowdil **TRIMMER CHAIN**

FOR
ALL MAKES
CONTINUOUS
BORING
MACHINES

USES
BOWDIL
THROW-AWAY
OR
1/2" x 1"
SHANK BITS



CHAIN PITCH
MAY BE VARIED
BY CHANGING
COUPLERS ONLY

NOTE
THIS

COUPLING PIN DESIGN

CHAINS MAY READILY
BE ASSEMBLED OR
DISASSEMBLED
WITH THE USE OF
SMALL HAND TOOLS

Great strength and flexibility. Highest grade steel "Fabri-Forged" to Bowdil standards of precision & performance.

The **BOWDIL**® *Company*

CANTON 7, OHIO

Phone Glendale 6-7176

SALES ENGINEERS IN

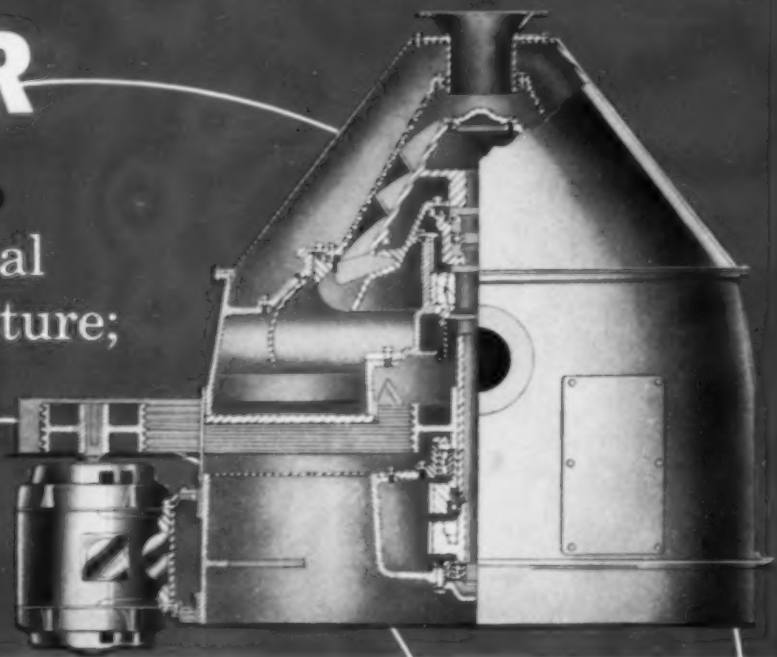
Whitesburg, Kentucky • West Frankfort, Illinois • Charleroi, Pennsylvania • Denver, Colorado • Danville, West Virginia • Canton, Ohio • Birmingham, Alabama • Helper, Utah • Kansas City, Missouri • Centerville, Iowa • Alberta, Canada • New Castle, England

CMI

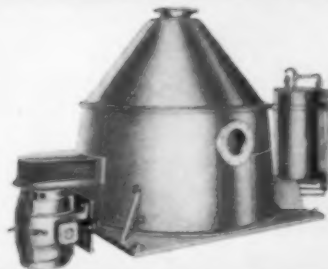
CONTINUOUS CENTRIFUGAL

DRYER

designed to
dewater coal
to 5% moisture;
high
rated
capacity



Accepted as standard equipment by most of the country's leading mines. Lowest power consumption...lowest maintenance cost...lowest "per ton" cost. Periodic inspections furnished and emergency service available from strategic locations.



Brochure No. E8-36 giving complete details available upon request.

CMI

CENTRIFUGAL AND MECHANICAL INDUSTRIES
INCORPORATED

146 President Street

Saint Louis 18, Missouri

MODERN MINING PRACTICE

CONTINUOUS MINING WITH LIVE BELT RESERVE

CRAWLER-MOUNTED SWIVEL PULLEY feeds live reserve belting into system

1CM-3 produces 4½ tpm with gathering arm clean-up. Also 5-CM, 4 to 5 tpm.

2BT-2 TWIN BORER full-face miner with adjustable trim chain, mines up to 8 tpm.

BRIDGE CONVEYOR connects miner and extensible belt regardless of their positions.

TAIL SECTION—EXTENSIBLE BELT moves with the miner to extend the belt.

TRUE CONTINUOUS MINING . . . This mine plan shows the very latest in continuous mining and haulage equipment. The recently developed **Belt Turns** permit the Extensible Belt to go around 90° corners. Using the Belt Turn, the Continuous Miner can be trammed up the entry to start another room without moving the drive section of the Extensible Belt. As the miner reaches the room location, another turn is added, and the miner proceeds.

LIVE BELT RESERVE

THE BELT TURNS make possible the storage of Live Belt Reserve in an unused room or entry, fed into the system from a crawler-mounted Swivel Pulley. Extending from the initial turn, this belt line permits up to 1,000 feet of system advance, which allows the Miner to continue its work without interruption.

Mine operators see in this development a truly continuous operation. No longer is it necessary to stop and add belt during a working shift.

DRIVE SECTION—EXTENSIBLE BELT stores the belt, controls tension, drives conveyor.

LIMBEROPE ROPE BELT CONVEYOR—Famous Limberoller idlers suspended between two wire ropes for main haulage system.

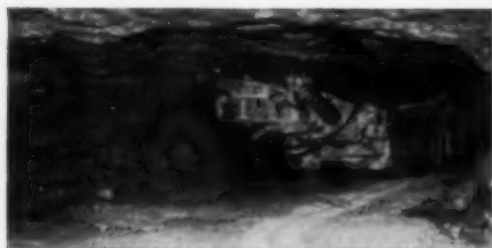
EX-BELT DRIVE

MAIN HAULAGE CONVEYOR

with **JOY** AC/DC EQUIPMENT

CONVENTIONAL MINING WITH JOY'S "15 SERIES" HIGH PRODUCTION TEAM

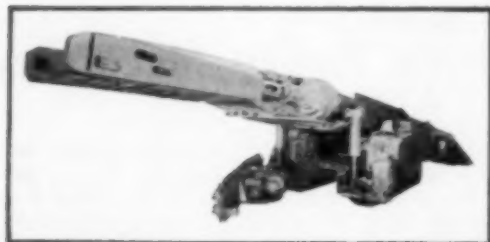
FOR 5-FOOT COAL AND OVER



15-RU CUTTER . . . a heavy-duty universal cutter designed for the hardest formations. Cutting motor 75 HP, continuous rating. It bottom cuts, top cuts, shear cuts or anything in between. Arranged for top cutting at 8½, 9½ or 10 ft.



CD-43 TWIN-BOOM DRILL . . . A one-man adaptation of the high-production, two-man CD-42 drill—operator positions and starts one drill while second is drilling hole—then alternates for continuous operation. Ten or twelve foot steels eliminate auger changes. Capacity 9 to 12 fpm, each drill.



15-BU LOADER . . . loads 15 tons per minute—has swing out service panel for accessibility to all operating and control mechanisms. All motors and drives mounted outside the frame. Model shown is 49½" high . . . lower model, 43" high works 50" coal.



15-SC SHUTTLE CAR . . . 57" high . . . hauls 15 tons in one load for easier faster loading; fewer trips; cheaper haulage. Two 2-speed 25 HP traction motors and one 15 HP pump motor provide power without clutches, torque converters or transmissions.

NEW!



6 WHEEL 18-SC FOR LOW SEAMS

A shuttle car with 6 wheels—hauls a big 4½-tons only 27" high—two traction wheels are in center of car. The car is hinged in middle—while car travels rises and depressions, car bends in middle, keeping all wheels on ground. Conveyor 6' wide, empties in 27 seconds. High tonnage for low seams.

WRITE FOR BULLETIN 250-1

-AC- MINING EQUIPMENT

All Joy equipment illustrated here is available as AC powered or DC powered. Joy leads in the development of AC equipment—built the first AC cutter back in 1913. Continuous experience in the design and development of AC face equipment since that time means that we have encountered and solved most problems common to AC mechanized mining.

If you are considering an all AC mine—or a single piece of AC equipment—consult a Joy engineer.

NEW CL750-000

**JOY MANUFACTURING
COMPANY**

Oliver Building, Pittsburgh 22, Pa.
In Canada: Joy Manufacturing Company
(Canada) Limited, Galt, Ontario.



Reboring 'cusp-cutter' to exact OEM Specifications at Leman's—a job not many are equipped for.

No Time Lost . . . Repairing Heavy Machinery

Because they have the facilities that assure fast, easy handling of even the heaviest mining machinery, Leman doesn't lose any time getting your equipment back on the job. And, as shown above, all parts are welded-up, straightened, machined and restored to their original condition. You get no warped or mis-fitting repairs back from Leman, where equipment is rebuilt as good or better than new.

Prompt, repair service pick-up right at the job of damaged or worn equipment plus a complete, modern machine plant and full staff of specialists enables Leman to eliminate waste motion—save you time and money on repairs. Equipped to repair, rebuild or remodel all mobile loading and mining equipment and electric locomotives, Leman has lead in authorized equipment repairs for over 35 years.

Phone or write for prompt job-site pick-up and delivery.

LEMAN MACHINE COMPANY

Box 236 PORTAGE, PENNA. Telephone 2051

LET'S BE SPECIFIC...

about facts why H & P Fine Coal
Cleaning Circuits are
operating so successfully.

We design and build coal preparation
plants with tried and tested H & P ap-
proved equipment, specifically . . . H & P
Fluid Bed Dryer, H & P Sieve Bend,
H & P Cyclones and Reineveld Fine
Coal Dryer

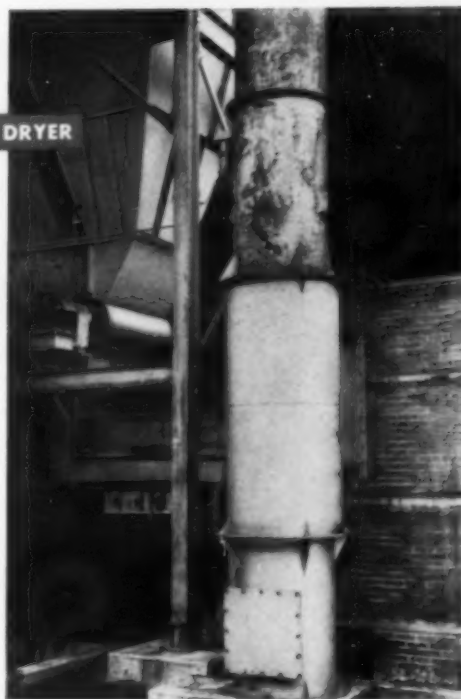
...in other words, the best equipment of its kind!

But above all, the H & P designed Coal
Preparation Plant is the product of a
team of enthusiastic, yet precisely ana-
lytical engineers who blend experience
with ingenuity. They, in turn, are backed
by modern production facilities and meth-
ods. To sum it up, you will find team-
work and know-how when you deal with
Heyl & Patterson.

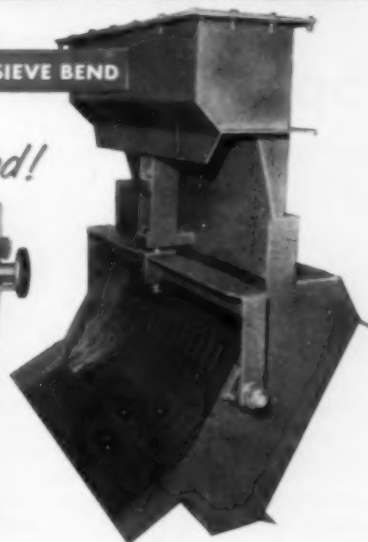
For complete information, request the visit of an
H & P Contracting Engineer or write for these
brochures:

- 557—Coal Preparation Plants
- 1157—H & P Cyclones
- 558—H & P Sieve Bend
- 247—H & P Bradford Breaker
- 557-R—Reineveld Fine Coal Dryer

H & P FLUID BED DRYER



H & P SIEVE BEND



H & P CYCLONE



REINEVELD FINE COAL DRYER



Heyl & Patterson INC.

114 FORT ADELL BLVD., PITTSBURGH 21, PA. — EDWIN J. GYER

News Roundup



13-yr men Noah Akers, Bethlehem Mines Corp., and W. A. Pack, Inland Steel Co.



11-yr man Guy Ratliff, Republic Steel Corp.



10-yr man Drexel Webb, Bethlehem Mines Corp.



8-yr man Elihu Coyer, Republic Steel Corp.

Spotlight on Safety

- Fatality Rates Down
- Big Sandy-Elkhorn Supervisors' Awards
- Three First-Aid Meet Winners
- Holmes Safety Award
- The Roof Bolt Story

COAL MINE SAFETY progresses steadily. The U. S. Bureau of Mines half-year summary of coal-mine fatalities shows the first half of 1958 to have a considerably lower fatality rate than the corresponding period in 1957. The key figures are coal-mine fatalities per million tons of coal produced and coal-mine fatalities per million man-hours worked.

In the first half of 1958 fatalities occurred at the rate of 0.73 per million tons of coal produced, down from the 0.96 figure of 1957. The other comparison shows that in the first 6 mo of 1958 fatalities occurred at the rate of 0.95 per million man-hours worked, a reduction from the 1.21 figure of 1957.

Even though production declined 22% and worktime 24% in the first half of 1958 compared to the first half of 1957, these fatality-rate figures show concrete improvement in coal-mining safety. Total coal-mining fatalities for the first half of 1958 numbered 151, a decrease of 40%

when compared to the same period in 1957.

Big Sandy-Elkhorn Awards

At the recent Annual Awards Night meeting of the Big Sandy-Elkhorn Coal Mining Institute 110 safety awards were

presented to mine supervisors representing six coal and steel companies. The individual winners had records of from one to thirteen years of work without a single disabling injury to employees under their supervision. Some of the winners are pictured on these pages.

First-Aid Meets

Punxsutawney, Pa.—Winner of the recent first-aid meet here was the Freebrook Corp. team representing Ringgold Cleaning Plant. Their score was 98.067. Second place went to the Northwestern Mining & Exchange Co. team from the Kramer mine, with a score of 97.267. Third and fourth places respectively went to teams from Cambria-Clearfield Mining Co. (Springfield No. 6 mine) and Blake Coal Co., Inc.

Nanty-Glo, Pa.—First place in the meet here was won by a team from Imperial Cardiff Coal Co.'s Cardiff No. 1 mine with a winning percentage of 98.850. Second place was taken by the Lancashire No. 15 mine team of Barnes & Tucker Co. with a score of 98.750. Third and fourth places in order went to Eastern Gas & Fuel Associates' Colver mine team and the Mine No. 73 team of Bethlehem Mines Corp.

Indiana, Pa.—Imperial Coal Co.'s Diamond Smokeless No. 2 mine team copped top honors in the first-aid meet held here. The winners ended with a 98.900 score. Second place went to Pine Township Coal Co.'s No. 1 and No. 2 mine team with a score of 98.850. Third and fourth places went to the

In This Section

People in Coal	p 30
Current Coal Patents	p 42
Mines and Companies	p 46
Association	p 48
Coal Abroad	p 50
Preparation Facilities	p 54
New Books	p 56
Meetings	p 59
Equipment Approvals	p 61

Kent No. 8 mine team of Rochester & Pittsburgh Coal Co. and the July 14 mine team of Crichton Coal & Coke Co.

Holmes Safety Award

The coal mining industry of the State of Washington has been awarded the Joseph A. Holmes Safety Award. Washington State's safety record shows over 2.3 million man-hours worked without a fatality during the period from February of 1955 to February 1958.

Over 1.4 million tons of coal were produced by an average of 459 men during this period of time. On behalf of the Joseph A. Holmes Safety Association Mr. Marling J. Ankeney, Director of the Bureau of Mines, presented the Certificate of Honor award to Governor Albert D. Rossellini representing the State and to Mr. Samuel Nicholls, president of District No. 10, representing the UMWA.

The safety association, which is named after the first director of the Bureau of Mines (1910-1914), is sponsored by the Bureau of Mines. This is the first time Washington State has won the award.

The Roof Bolt Story

The latest statistics on roof bolting tell an interesting and important tale. According to Marling J. Ankeney, Director of the Bureau of Mines, more than 20,000 miles of roof bolts were installed in American coal mines last year as a safety measure to curb roof falls. In the past 10 yr some 500 coal mines in 13 states have adopted roof bolting.

Not only have roof bolts made mines safer, but they have increased production too. Roof bolting has made possible the use of large, high-capacity modern mining machinery by replacing much of the conventional wooden timbering which had restricted operations of men and equipment.

Last year 229 of the more than 500 mines employing roof bolts reported that their entire output was from roof-bolted areas. Of the 358 million tons of bituminous coal produced last year in

(Continued on p 28)



7-yr men (from left to right): Ed Boggs, Royal Fleming, Hershel Childers, Bethlehem Mines Corp.; Raymond Ratliff, Republic Steel Corp.; Estill Cox, Bethlehem Mines Corp.; and Robert England, Inland Steel Co.



6-yr men (from left to right): Worley Mace, Delbert Davis, Howard Ferguson, Elzie Yates and Virgil Blevins, all of Inland Steel Co.



5-yr men (left to right): Elmer Ferguson, Inland Steel Co.; Dow Webb, Princess Elkhorn Coal Co.; Roy Conley, Inland Steel Co.; Walter Arrowood, Princess Elkhorn Coal Co.; and Clayton Dickerson, Inland Steel Co.



COAL AGE • September, 1958



Freebrook Corp. team (left to right): Melvin Thomas, Irvin Gruver, Floyd Beers, George Startzell, Merle Reed, Kenneth Dinger (captain) and V. A. Stanton, district manager of Mine Safety Appliances Co.

27

News Roundup (Continued)



Imperial Cardiff Coal Co. team (left to right): kneeling—Herbert Strum (captain), James Henshaw, William Black; standing—John Pabrazinsky, Eddie Stiffler, Joseph Crawford and Paul Ludwig.



Diamond Smokeless No. 2 Mine Team (left to right): front row—John Simon, James Clements, John Rensko (captain), Thomas Hamacek; back row—Donald L. Alberter (mine superintendent), Morris Troska, Francis Mort, George Svilar and Everett White of Mine Safety Appliances Co.

underground mining, about 180 million tons came from roof-bolted sections.

During 1957 mines installed an average of more than 3 million new roof bolts a month—enough to girdle the earth if placed end to end. West Virginia led in the number of coal mines

using roof bolts, followed by Kentucky and Pennsylvania.

Next month look for the winners and scores of the Westmoreland County, Allegheny-Kiski and Southwestern Pennsylvania first-aid meets in this section of Coal Age.

Coal to Block Fuel Conversions

The National Coal Association, the UMWA and several members of Congress have joined forces to protest the conversion of government boiler rooms from coal to competing fuels.

Coal industry statistics listing government installations where heating plants are being converted have spurred Senator John D. Hoblitzell Jr. (Rep.—W. Va.), Congresswoman Elizabeth Kee (Dem.—W. Va.), Congressman Daniel J. Flood (Dem.—Pa.) and other members of Congress to question the economic reasoning behind these moves. Individually, they all have pointed out that modern coal-burning equipment and assured availability of the fuel at reasonable prices add up to better heat at lower cost than with other fuels. Congressional aid is being lent NCA's efforts to conduct heating surveys of the installations in order to show that coal would be the best fuel.

While the amount of coal involved at present is not large, the coal backers feel that coal is being discriminated against by the government, and that the discrimination is not based on a real knowledge of heating costs and economies.

Army installations form the major number of proposed conversions. However, the Army has already agreed to give the NCA heating experts a chance to present the case for coal, and it is hoped that other heating re-evaluations will take place.

Congressman Flood has proposed a bill which would require architects of future government buildings built in the U. S. to submit alternate plans utilizing anthracite heating units.

Research Bill

Legislation to establish an independent coal research commission to study new uses for coal has been hailed by coal industry leaders.

The commission would be empowered to formulate and execute an over-all research program designed to encourage production and consumption of coal in the U.S., and to appoint advisory committees to assist it in carrying out this program. Furthermore, it would coordinate all public and private coal research in the nation.

The bill has passed the Senate by a unanimous vote and has been put on the House calendar. There is a good chance that the House will vote on it during

(Continued on p 38)

The **GOODMAN** Performance Report



22288



22291



22302

Shown here is a typical Goodman AC combination—2400 cutter, 965 loader, 584 shuttle car and Ropebelt conveyor... installed by a Kentucky mine. All are fast working machines, designed and built by Goodman to give maximum output and maximum return for dollars invested.

AC Mining Machinery

Much has been printed lately about AC power for underground mining, and a trend toward greater use of this power for all types of face equipment in both conventional and continuous mining systems.

If you are installing AC power in a new mine, or, converting partially or in full at an older property to secure such electrical advantages as high efficiency, low cost, and safety, here's a point to keep in mind . . .

Goodman has been designing and building AC mining machinery for 45 of its 58 year corporate life. Today it has available, for both high and low coal, a complete line of AC cutting machines, loaders, shuttle cars, conveyors and continuous borers. From original design to final assembly, each of these AC machines has been built specifically for AC operation—with particular attention to motors that are Goodman-built for mine service.

GOODMAN

MANUFACTURING COMPANY

Halsted Street and 48th Place, Chicago 9, Illinois

CUTTING MACHINES • CONVEYORS • LOADERS
SHUTTLE CARS • LOCOMOTIVES • CONTINUOUS MINERS

Use Genuine Goodman Replacement Parts

People in Coal



Harry Winston Bradbury of Glen Alden Corp.

Coal in His Blood

HARRY WINSTON BRADBURY started his coal mining career shortly after the turn of the century in England, at the age of 14. In the middle of 1958 he was elected president of Glen Alden Corp., biggest U.S. producer of anthracite.

In between lie over 40 yr of service to the coal industry. Mr. Bradbury's first job in the U.S. was as a coal loader in Franklin County, Ill. Following WW I service, he steadily climbed in the 20's and 30's from assistant mine foreman to superintendent and general manager of various companies.

He owned and operated his own mine in Sparta, but sold it in 1941, and following courses in mine inspection, became a Federal mine inspector in 1942. His interest in safety training and the safety factors in coal mining are still very much alive today. In 1945, Mr. Bradbury became associated with Standard Ore & Alloys of N.Y. which eventually led to the formation of Midwest Utilities Coal Co. and his presidency.

In 1947, he built the famous Green Diamond mine and in 1952, he built the Bradbury mine, named in his honor, for Midwest utilities. Both these mines are very modern and illustrate Mr. Bradbury's great interest in mechanization.

In April, 1954, he was elected a director of Lehigh Valley Coal Sales Co., and in September he became vice president of that company, and both Lehigh Valley Coal Co. and Lehigh Valley Coal Corp. Then he was elected president of these companies and of the subsequent Lehigh Valley Industries, Inc.

Mr. Bradbury, who is a member of several mining societies, devotes his spare time to cattle raising and farm land development. He owns two farms in Illinois.



Donald C. McGraw Jr. Joins Industrial Distribution

Donald C. McGraw Jr. has been appointed associate publisher of *Industrial Distribution*, a publication of the McGraw-Hill Publishing Co., Inc., New York, N.Y., effective September 1, 1958. Prior to his appointment he had been advertising sales manager of *Coal Age*, *Engineering & Mining Journal* and *E&MJ Metal & Mineral Markets*, other McGraw-Hill publications. Mr. McGraw joined the company in August 1950 as

an advertising salesman. Before that he had worked for the G. M. Basford Co., an advertising agency, and for the *Flower Grower*. He attended the College of William & Mary and the Carnegie Institute of Technology. Mr. McGraw was on active duty with the United States Naval Reserve for 4 yr.



Henry C. Rose, President of Pittsburgh Coal Co. Div. of Consol, has resigned for reasons of health. He will be succeeded by **George O. Tarleton**. Mr. Rose graduated from Ohio State University in 1924 and spent several

years as mining engineer for American Rolling Mills Co. In 1928, he joined the engineering department of Pittsburgh Coal Co. and climbed from assistant superintendent of Montour No. 10 mine to assistant production manager of the company. In 1940 he was appointed production manager. In 1949, he was appointed vice-president of Pittsburgh Coal and two yr later he was made president of Pittsburgh Coal and a vice-president of Consol.



George O. Tarleton has been appointed president of Pittsburgh Coal Co. Div.



Meanwhile, back at the mine . . . the power shovel

was still going strong. This is the kind of performance mine operators have come to expect from Simplex **TIREX**® cords and cables.

No cable should ever be subjected to such abuse, of course, but sometimes it does happen. And that's an excellent reason why you should use Tirez.

Tirez, with its cured-in-lead, fortified and tempered neoprene armor, is designed to resist the toughest sort of punishment, give you long, dependable service.

BENDS without BREAKING
TWISTS without KINKING
SNAKES without SNAGGING



Simplex WIRE & CABLE
C O M P A N Y

79 SIDNEY STREET, CAMBRIDGE 39, MASS.

"The American manufacturers of transoceanic telephone cables"

People in Coal (Continued)

of Consol. He rose from a 15-yr-old laborer in Consol mines through the ranks as section foreman, mine foreman, mine superintendent and general superintendent at various Consol mines in W. Va. until 1942, when he was appointed manager of the Maryland and Pennsylvania operating divisions. In 1946, he was appointed vice-president of operations of the Kentucky Div. and in 1953, he was appointed president of that division, being made a vice-president of Consol at the same time. In 1956, he was transferred to Pittsburgh as vice-president until his most recent promotion to succeed Henry C. Rose.

R. F. Wesner has been elected vice-president in charge of operations for Boone County Coal Corp. He will continue as general manager and will maintain headquarters at Sharples, W. Va.

Otis J. Gibson has been elected secretary of Old Ben Coal Corp. For the past seven yr he has served as general attorney of the Western Pacific Railway.

J. W. Dorff has been named general
(Continued on p 37)



Accident Prevention: Bishop No. 34 Mine

ACCIDENT PREVENTION at Pocahontas Fuel Co.'s No. 34 mine, Bishop, Va., is serious business. Offices of UMWA Local 6025 and company officials have united to carry out the slogan "No Accidents at the Bishop mine." Spearheading the drive that got more than 500 men to participate in the U.S. Bureau of Mines accident prevention course held at the mine portal are (left to right): seated—Joe McClellan, supt.; Frank Shelley, chairman, Safety Committee;

Andrew Johnson, president, Local Union 6025; Lloyd G. Fitzgerald, U.S. Bureau of Mines instructor; standing—R. H. Mayberry, company safety inspector; Louis Roncaglione, company director of safety; J. F. Meade, general mine foreman; T. K. Henegar, Safety Committeeman; and H. L. Clark, ass't. supt. A mine explosion on February 4, 1957, took the lives of 37 men in this mine. The current safety program represents part of an outstanding safety campaign here.

AMERICAN CABLE HANGERS FOR ROOF BOLTS



PATENT PENDING

**keep cables off the floor -
get longer cable life -
save money**

**EASY TO INSTALL STURDY
EASY TO REMOVE FIT CLOSE TO ROOF
USABLE MANY TIMES PLAIN OR PAINTED**

Additional Literature Upon Request

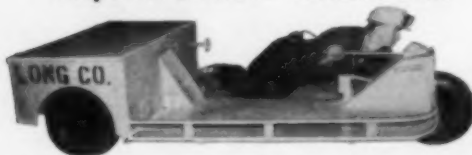
AMERICAN MINE SUPPLY COMPANY

404 PRICK BUILDING

PITTSBURGH 19, PENNA.

NEW LONG

"Inspector's Friend" UTILITY CAR



A battery-operated utility vehicle, the LONG "Inspector's Friend" is designed for personnel and supply handling. With a capacity of operator plus 500 pounds, its primary applications are: traveling between the belt drive unit and the face; transportation for supervisory, engineering, and maintenance personnel; supplying breakdown items to the face during the working cycle; assisting in rock dusting; etc.

Although developed by LONG specifically for coal mines, the "Inspector's Friend" is similar in principle to the personnel vehicles that are so widely used in industrial plants. It's readily maneuverable, easy to handle, will work two shifts between battery charges, and is available in 3 models (24", 36" and 60" minimum tramping height) with either open or permissible type electrical construction.

Write today for details or a demonstration.

The **LONG** Company
Oak Hill, W. Va.

Easy to work with . . . safer, too!



O-B EXPANSION SHELLS AND PLUGS

Because they "go up easy and stay put," O-B Shells and Plugs offer an extra margin of safety for bolting crews.

Crews spend less time under unbolted roof because they work more smoothly and efficiently. Their bolts don't hang up in the bolt holes, because the fingers of the O-B shell were designed to flex in order to overcome minor variations in the size and shape of the bolt hole. Their bolts don't fall out of the holes before wrenching begins, because the weight of the bolt alone is enough to start an O-B unit expanding.

And because the bolt doesn't have to be held in place as the wrench is brought up to tighten it, the bolting machine operator has both hands free to run his machine — doesn't risk catching a finger somewhere between roof, roof plate, and wrenching socket.

These are just a few reasons why so many mine operators order their shells and plugs by the catalog numbers shown below.



O-B Standard

21889—for $\frac{3}{4}$ -inch bolts
21890—for $\frac{5}{8}$ -inch bolts



O-B Bail-Type

22378—for $\frac{3}{4}$ -inch bolts
22463—for $\frac{5}{8}$ -inch bolts

Ohio Brass





O-B "CAP SCREW"

for fast, interchangeable cable



STRAIGHT-THRU CONNECTORS

For connecting machine or feeder cables in straight line. Separate halves are also used with Tee and Plate shown below. (Catalog numbers cover complete connectors—two identical halves.)

For Copper Cable		For Aluminum Cable	
Type-CS		Type-CSA	
Cat. No.	Copper Cable Size	Cat. No.	Aluminum Cable Size
22486	4/0	22722	795,000 cm
22487	350,000 cm		
22488	500,000 cm	22720	1,590,000 cm
22489	750,000 cm		
22490	1,000,000 cm		



TEE CONNECTORS

For tapping off straight-thru cables without cutting them. (Half of straight-thru connector is used for the branch cable.)

For Copper Cable		For Aluminum Cable	
Type-CS		Type-CSA	
Cat. No.	Copper Cable Size	Cat. No.	Aluminum Cable Size
22564	500,000 cm	22723	795,000 cm
22565	750,000 cm		
22566	1,000,000 cm	22718	1,590,000 cm



CONNECTOR PLATE

For making three-way connections between cables or for tapping off between cable sections. For use with either Type-CS or Type-CSA.

Cat. No. — 22551

Note: With each shipment of any of above fittings, required hex wrenches are included on the order free of charge.

**NOW AVAILABLE FOR
COPPER OR ALUMINUM**

CONNECTORS...

connections throughout the mine!

NEW! TYPE-CSA CONNECTORS FOR ALUMINUM!

Now—O-B offers "Cap Screw" Cable Connectors for aluminum as well as copper cable!

Called the Type-CSA Connectors, the new line is identical in use—and almost identical in appearance—with the popular O-B Type-CS Connectors (for copper cable). What's more important, the two types are completely interconnectable!

So now you can make fast interchangeable connections between all popular sizes of single conductor cable—regardless of whether you're joining copper to copper, copper to aluminum, or aluminum to aluminum!

Using either or both types of cable, you can extend feeder, add or remove sections of machine cable, tap off straight-thru feeders, make three-way connections between feeders, make switch and panel connections—make a wide variety of strong, uniform, high-capacity connections—quickly, simply, neatly—just by tightening several cap screws!

As shown on the right, each complete Straight-Thru Connector consists of two identical cable clamps, which overlap and are bolted together with two cap screws at their tang ends. When you leave a connector half permanently attached to a cable end, you can connect that cable to any other connector half, Tee Connector (opposite page), or Connector Plate, whether Type-CSA or Type-CS, simply by tightening two cap screws!

Order from listings on opposite page.

Ohio Brass




The safest tap ever made is still being made by O-B!



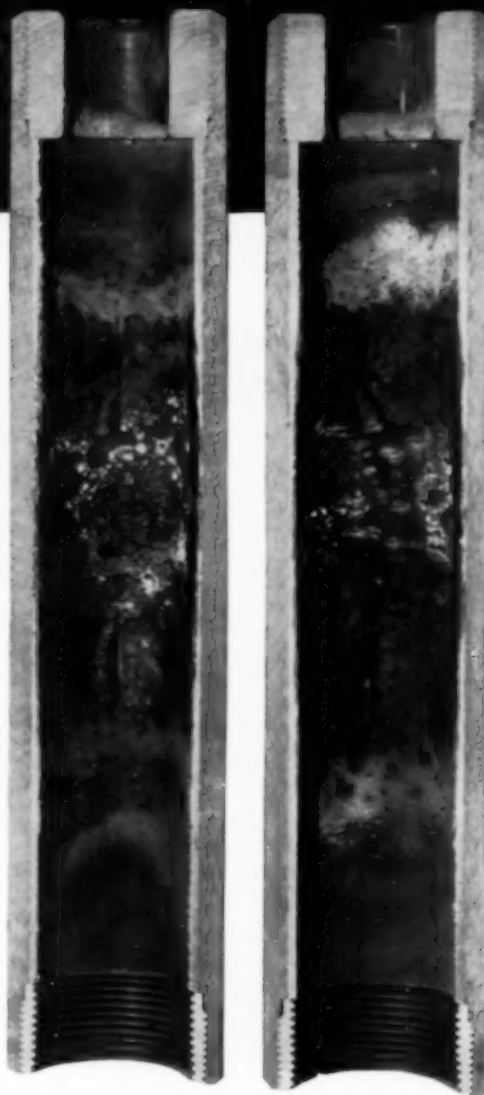
This unretouched photograph shows the inside of an O-B tap case after a standard O-B arc resistance test.

The test consisted of maintaining a 150 to 200-ampere arc between two carbon rods in the case for 30 seconds. As you can see, the heavy phenolic case of the O-B tap was undamaged by the vicious arc—the outside surface of the case wasn't even blistered or discolored. The only damage was a small hole burned in the asbestos lining. Another tap case, not of O-B manufacture, received the same treatment at the same time—and provided a striking contrast.

A hole was burned completely through the other tap case in 15 seconds (half-way through the test) and the case caught fire and continued to burn for 2 minutes, 50 seconds after the power was turned off!

We prove it to ourselves—and to our customers—over and over again: the *safest* tap ever made is *still* being made by O-B!

Ohio Brass Company, Mansfield, Ohio
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.



Above: O-B tap case, cut in half after test.

Ohio Brass

4825-M

People in Coal (Continued)

manager of both Cannelton Coal & Coke Co. and Lake Superior Coal Co., Cannelton, W. Va. In addition, **R. L. Turner** becomes superintendent of Cannelton Coal and **N. G. Clonch** becomes superintendent of Lake Superior Coal Co.

George H. Drum has succeeded **Hayden Owens** as superintendent of Hazelton Div., Lehigh Valley Coal Co. Mr. Owens retired after 38 yr of service with the company.

Walter L. Pedigo has been elected president of Kentucky Coal Agency, Inc. For the last 10 yr he has been director of traffic for the coal agency.

William B. Jamison has left Consolidation Coal Co. to join his brothers in a newly formed family corporation, Jamison Coal Co. of Greensburg. He was formerly assistant to the operational vice-president of Consol.

Eugene Schoener has been elected executive vice-president of Lehigh Valley Industries, Inc. In addition, he was elected president of Lehigh Valley Coal Sales Co. and Lehigh Valley Coal Co. Mr. Schoener has been associated with Lehigh Valley Coal since 1954 as treasurer and vice-president.

Henry S. Weatherholt, former general manager of Lehigh Valley Coal Co., has been elected to the office of vice-president of that company. He joined Lehigh Valley Coal in May 1958.

David L. Francis, president of Princess Elkhorn Coal Co., has been reappointed chairman of the Natural Resources Committee of the U.S. Chamber of Commerce. Other committee members from the coal industry are: **Stanlee Hampton**, Tennessee Consolidated Coal Co.; **H. John Harper**, Coal Div. of Eastern Gas & Fuel Associates; **Harry LaViers**, South-East Coal Co.; **Edwin R. Phelps**, Pittsburgh & Midway Coal Mining Co.; and **Walter F. Schulten**, Consolidation Coal Co.

Jesse O. Williams of Hart & Hart Coal Co., Providence, Ky., was reelected president of Kentucky Reclamation Association, Inc. Other officers include **O. E. May**, P & M Coal Mining Co., and **G. N. Ranney**, Riverview Coal Co.

Obituaries

William Blizzard, retired president of United Mine Workers District 17, died of cancer on July 31st in Charleston, W. Va., at the age of 65. For upwards of 40 yr he worked and fought for the W. Va. coal unions. Perhaps his great-

est fame came from his participation in the most violent sagas of union development, including the Mingo Mine War, the Battle of Blair Mountain and the Cabin Creek troubles. Mr. Blizzard made the headlines when he became the only West Virginian ever tried for treason against the state. This charge stemmed from the Battle of Blair Mountain where he helped lead union men and sympathizers in a pitched battle with sheriffs' deputies, state militia and federal troops. The battle was an aftermath of union organizing following World War I. Mr. Blizzard was ac-

quitted of the treason charge, then tried on a murder charge and acquitted of that also. He retired from his UMWA post in 1955 after having served 33 yr as legislative representative of the union.

Ralph H. Moore, vice-president of Rich Hill Coal Mining Corp., died in Cresson, Pa., on July 28th at the age of 64. He was past president of the Central Pennsylvania Coal Producers' Association and the Eastern Bituminous Coal Association, and was currently serving as vice-president of both associations.

THE WAGNER WL-20

"Loading 35 yds. of raw coal every 3½ minutes
... bringing production up 65% per shift!"



Wagner Features 4-Wheel Drive, 4-Wheel Steering and 2-Axle Oscillation

See this big 8-yd. WAGNER WL-20 in use at the GILBERTON COAL CO., Gilberton, Pa. The *only* loader on the market today capable of loading 35 yds. of raw coal every 3½ minutes, in truck bodies measuring 12' high and 11' 6" wide—but the WAGNER *spots* its load in dead-center!

- OPERATING COSTS CUT!
- ONLY ONE OPERATOR NEEDED!
- NO DOZER NEEDED FOR CLEAN-UP!



John W. Rich, Vice Pres.
Gilberton Coal Co.
Gilberton, Pa.



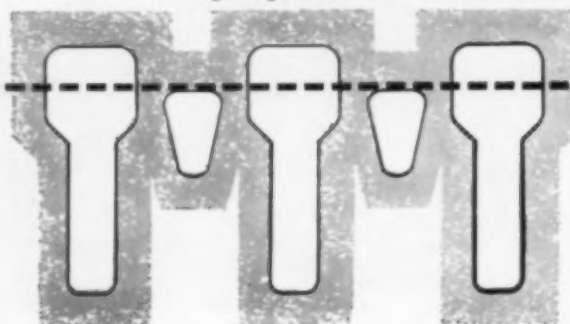
WAGNER
Rubber-Tired
Tractors

WAGNER TRACTOR, INC.
8027 N. E. KILLINGSWORTH
PORTLAND 20, OREGON

Dealerships available in some
areas. Inquiries welcomed.



screen worn to this point equals new standard type screen



"T" and "WEDGE" wire combine to create the ultimate in...

GUARD BAR DESIGN—high "T" profile wire between every wedge shaped wire performs as guard bar and screen

GUARD BAR ECONOMY—new design effects added screening surface, small screen efficiency with large screen life

with *I.F.A. independent flexing action for non-blinding, non-clogging performance

new T-WEDGE screen is especially adaptable for flumes or vibrator applications—can be easily interchanged with other types of Kleenslot screens without mechanical changes—abrasion resistant stainless steel
FOR ADDITIONAL INFORMATION . . . write

*patent applied for



News Roundup (from p 28)

this session, but if it does not, the next session of Congress should see it acted upon. Congressmen from coal producing areas hope that the results of the commission will give coal a needed lift.

Scholarships

Three students in mining engineering have recently been granted scholarships at Pennsylvania State University for the coming academic year.



Pictured above is Robert W. Hellmuth of Harrington Park, N.J., who received the \$600 Mathew J. Wilson award. Hellmuth is an entering freshman and was very active in high school athletics and extra-curricular activities, in addition to graduating near the top of his class.



David D. Reed of Tarentum, Pa., has been awarded a \$1,000 Joy Mfg. Co. scholarship. Reed (shown above) is a junior at the University and has worked for Joy for the two preceding summers. This is his third successive Joy scholarship award.



Pictured above is Thomas V. Falkie, a graduate student at the University working toward his doctorate in mining engineering. He will receive a U.S. Steel Foundation fellowship. Mr. Falkie is married and is employed as a research assistant at the University.

Wyoming Coal Used

Recent developments have given Wyoming coal a big shot in the arm. Industry, too, will benefit from increased coal use in the state.

Construction is slated to begin next spring on a big new \$34 million power plant for Utah Power & Light Co. to be located 15 mi north of Kemmerer, Wyo. The utility has signed a long-term lease with Kemmerer Coal Co. to use 35 million tons of coal. The first 150,000-kw unit is expected to burn 500,000 tons a year.

This is the second large steam-electric plant to be built in Wyoming in two yr, and both state and coal industry officials are hoping it signals an upturn for Wyoming coal, after a decade of decreasing activity. High voltage transmission lines will be built to Ogden, Utah, and Evanston, Wyo., from which many cities in Utah and western Wyo. will be supplied.

Synthetic fuel plants using coal as a raw material may be built soon thanks to a bill passed by Congress.

The measure triples the acreage of public coal lands that can be leased by a single firm. Wyoming officials say that this bill paves the way for a \$50 to \$150 million synthetic fuel plant at Rock Springs, Wyo., and developments of iron ore deposits near Cheyenne.

Union Pacific Co. has plans to extract synthetic fuels and chemicals from coal and use the remaining char as fuel for a steam plant if restrictions on use of coal from its right-of-way for locomotives only are lifted.

(Continued on p 44)

how to make your own mine roof jacks

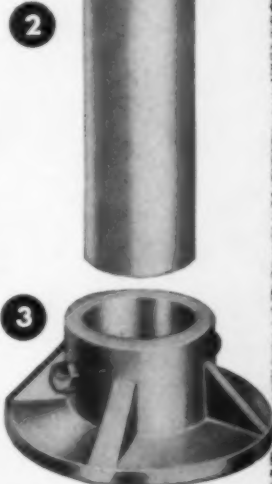


1. Duff-Norton supplies the head and handle.
2. You supply the pipe to fit your desired height.
3. Add the desired Duff-Norton base and you have the perfect mine roof jack.

Here's all you do—(1) cut any 2-inch standard steel pipe into lengths desired and (2) attach safe, strong, dependable Duff-Norton head, handle and base fittings. That's all!

You choose the type of heads, handles and bases best suited to your particular needs. They are available in a variety of types in both 8 and 16-ton capacities (16 ton requires 2-inch *extra strength* pipe). All fittings are painted light grey for better visibility.

For complete information on Duff-Norton mine jacks, see your local distributor or write the world's oldest and largest manufacturer of lifting jacks for your free copy of catalog AD-10J, "A Handy Guide for Selecting Duff-Norton Mine Jacks." This catalog contains complete information not only on mine roof jacks but other popular Duff-Norton jacks for useful trouble-free service in and around coal mines.



DUFF-NORTON COMPANY

P. O. Box 1889 • Pittsburgh 30, Pennsylvania

COFFING HOIST DIVISION • Danville, Illinois

DUFF-NORTON JACKS

Ratchet, Screw,
Hydraulic, Worm Gear



COFFING HOISTS

Ratchet Lever
Spur Gear, Electric

If you watch cable costs



11 conductors in this continuous miner cable, yet see how flexible it is.

you'll like Tiger Brand

It's always a thrill to walk into a tough, cost-conscious mine and find that they are using huge quantities of Tiger Brand Amerclad mining cable. It vindicates our attitude that mining cable *must* be built to the very highest standards.

Our flat "Bridgewall" cable is an example. Tiger Brand flat twin mining cable in sizes #1 and smaller actually has a thick wall of neoprene between the insulated conductors. It locks the conductors and ground wire (if specified) in a tight embrace and holds them there—even when the cable is badly bent or twisted. No other type of construction is so durable.

Naturally, flame-resistant jackets are used throughout. And all of these very-heavy-duty cables are vulcanized in a lead mold under pressure, to insure a dense, tough jacket. *Money cannot buy a better cable!*

USS, Tiger Brand and Amerclad are registered trademarks



This special cable was made for continuous miner. It contains power, grounding, lighting and communication conductors.



Rubber-tired buggy fed with "Bridgewall" Tiger Brand. Cable is under continuous strain.



Tiger Brand Electrical Wire & Cable

a standard Tiger Brand cable for every special job!

Asbestos Wire & Cable • Mold Cured Portable Cord • Shovel & Dredge Cable • Paper & Lead Cable • Varnished Cambric Cable
Interlocked Armor Cable • Special Purpose Wire & Cable • Aerial, Underground and Submarine Cable

American Steel & Wire
Division of



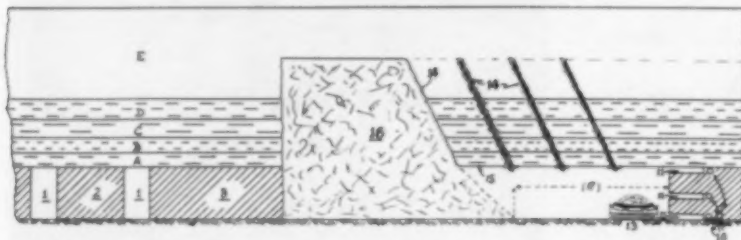
United States Steel

Columbia-Geneva Steel Division, San Francisco. Pacific Coast Distributors • Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors • United States Steel Export Company, Distributors Abroad

Current Coal Patents

By Oliver S. North

Extensible conveyors, J. Craggs and K. McCann (assigned to Goodman Mfg. Co., Chicago, Ill.), Aug. 5, 1958. Improvements in extensible conveyors whereby the troughing roller assemblies may be readily disposed in proper position on the wire rope support strands. No. 2,846,050.



Mining method for supporting geological structures, P. B. Bucky, Aug. 5, 1958. In a method of supporting overlying formations so as to prevent surface subsidence in mined out areas, the roof of the workings is supported with roof bolts. When withdrawing from an area,

Extensible conveyors, E. R. Bergmann (assigned to Goodman Mfg. Co., Chicago, Ill.), Aug. 5, 1958. A signal device is provided for an extensible belt conveyor which will notify the operator when belt storage loops are approaching a condition where they will not be able to pay out any additional belting, thereby preventing damage to the belt. No. 2,846,054.

the bolts are removed and the holes loaded with explosive and shot. The fragmented rock thus produced fills the working with loosely compacted fill which prevents collapse of overlying formations (see diagram). No. 2,846,205.

Method for carbonizing carbonaceous materials, M. F. Nathan (assigned to M. W. Kellogg Co., Jersey City, N. J.), July 22, 1958. Low temperature fluidized carbonization process for treating coal, lignite, shale, oil sands, etc., and particularly for recovering solids suspended in the fluidizing gases. Gases containing entrained carbonaceous solids are combined with gases carrying entrained char particles, and the combined solids recovered as a product by a scrubbing operation. No. 2,844,526.

Treatment of carbonaceous solids, M. F. Nathan (assigned to M. W. Kellogg Co., Jersey City, N. J.), July 29, 1958. Improved method and apparatus for the fluidized drying and heating of carbonaceous solids, such as coal, lignite, shale, oil sands, etc. Provision is made of contiguous, openly communicating drying and preheating zones. Solids are passed from preheating zone to drying zone in sufficient quantity to supply the heat required to dry the wet feed solids. No. 2,844,886.

Screening apparatus, L. Schiebusch, Aug. 5, 1958. Apparatus for screening fine wet coal, for example in the 7-12 mm size range, consists of a double deck screen and a bottom plate. The lower screen is heated by the bottom plate, which is made of a diamagnetic material. No. 2,846,070.

Washing jig, J. J. Richard (assigned to Link-Belt Co., a corporation of Ill.), Aug. 5, 1958. Design for a coal washing jig having a very high processing capacity which will efficiently clean and separate the coal from the slate and other waste materials. Separately actuated impulses of the washing liquid are effected in different sections of a wide bed of mineral particles. No. 2,846,071.

Apparatus for handling conveyor belting for an extensible conveyor, J. Craggs and K. McCann (assigned to Goodman Mfg. Co., Chicago, Ill.), Aug. 5, 1958. Improved construction of extensible belt conveyors, whereby lengths of belting may be placed and removed more rapidly than has been possible heretofore. No. 2,846,051.

Fluid energy grinding, L. T. Work (assigned to Texaco Development Corp., New York, N. Y.), Aug. 5, 1958. Design for a new apparatus and method for fluid energy grinding of coal and other minerals, whereby erosion of the grinding tube is substantially eliminated and relatively low grinding temperatures may be employed. The material to be ground is first suspended in a volatilizable liquid, such as water, kerosene, mineral oil, propane or butane prior to introduction in the apparatus. No. 2,846,150.

CHEMICALS FOR MINING

OPERATION . . .

PREPARATION . . .

MAINTENANCE . . .

Certigrav

A STANDARDIZED GRAVITY
FLOAT AND SINK SOLUTION

ACCURACY

Accuracy controlled during evaporation. Certigrav maintains a gravity tolerance of $\pm .008$ over a 20° F spread. Certigrav can be tailored made to your temperature specifications, correct to $\pm .002$.

SAFETY

Toxicity wise—has maximum allowable concentration greater than eight times that of carbon tetrachloride.

AVAILABILITY

Available in gravities from 1.30 to 1.60 in increments of 0.05.

SAVES YOU MONEY

Certigrav is cheaper for you based on operational costs because:

1. Standard Solution — no makeup necessary.
2. No time lost due to constantly checking gravity during float and sink operation.
3. No time lost, no material cost or labor cost for additive or correcting gravities.
4. Computed to be 30 times safer than carbon tetrachloride on a time exposure basis*.

*Based on index arrived at by multiplying MAC by evaporation rate.

AMERICAN MINECHEM COMPANY

Chemicals for the Mining Industry
CORAOPOLIS, PA.



Your MONEY DOWN the DRAIN

Is this scene part of your coal cleaning operation? Are you literally flushing tons of salable coal down the drain? Coal which cost you money to produce . . . and which, if saved, would show a profit.

And what about those gallons of water now being wasted for every ton of coal cleaned? . . . water which could be used over and over!

IS AN OUTMODED CLEANING PLANT

WAXING FAT ON YOUR PROFIT DOLLARS?

**FAIRMONT
MACHINERY COMPANY**

FAIRMONT / WEST VIRGINIA

Our 61 years experience qualifies us to step up the efficiency of your existing plant. Call Fairmont, W. Va. 1672 and a Fairmont engineer will consult with you and analyze your facilities for possible cost and savings.

CONTRACT CORE DRILLING

EXPLORATION FOR MINERAL DEPOSITS
INCLUDING URANIUM & LIMESTONE — ANYWHERE

FOUNDATION TEST BORING • GROUT HOLE DRILLING

Skilled crews and complete stock of core drills
and accessory equipment maintained at all times

Core Drill Contractors for more than 60 years

JOY MANUFACTURING CO.
Contract Core Drill Division
MICHIGAN CITY, INDIANA



for tough coal screening operations

CF&I SPACE SCREENS

Manganese—CF&I Manganese Space Screens, made of $1/4"$ or heavier wire, are extremely shock-resistant. This type of screen takes crushing, tumbling, pounding in stride, lasts longer on scalping operations or similar tough screening jobs. Eliminate needless, costly downtime . . . get CF&I Manganese Space Screens.

Other CF&I Space Screens for Coal Screening Operations include:

Wisscoloy®—a rugged, economical, general-purpose screening tightly woven of

carefully crimped special alloy steel wire. **Stainless Steel**—a durable, unexcelled quality screening for washing and other operations where wet, corrosive materials must be processed.

Whatever your coal screening requirements, there's a CF&I Space Screen designed for the job. Furnished in a wide range of standard dimensions, CF&I Space Screens can be supplied with the edge preparation you specify. Contact the CF&I sales engineer in our office nearest you.

CF&I SPACE SCREENS THE COLORADO FUEL AND IRON CORPORATION

In the East: WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia

In the West: THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo • Billings • Boise • Butte • Denver • El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Antonio • San Francisco • San Leandro • Seattle • Spokane • Wichita

CF&I OFFICES IN CANADA: Montreal • Toronto

CANADIAN REPRESENTATIVES AT: Calgary • Edmonton • Vancouver • Winnipeg

5923

News Roundup (from p. 39)

Research Program

Imperial Coal Corp. of Johnstown, Pa., and Pennsylvania State University have begun a cooperative research program in rock mechanics. Imperial Coal is giving financial support and has provided the Diamond mine, near Johnstown, for field work. The University has assigned a graduate assistant, William Lane, to the project and is providing laboratory facilities in the Department of Mining.

The investigation will entail a study of roof and floor conditions in the mine with the objective of minimizing the problems encountered with rock strata overlying and underlying the coal seam being mined. Plans are to measure the extent of the load developed on roof supports in the mining area and to install special instruments to determine the success of modifications in the mining plan. Laboratory studies of rock specimens and mine models will be carried out.

Mr. Herbert E. McGinnis will represent Imperial Coal on the project, and Mr. Robert Stefanko, Instructor, and Dr. Howard L. Hartman, Head, Department of Mining, will have charge of the project for the University.

Montana Stripping

A coal stripping operation has been started 20 mi southwest of Sidney, Mont. Coal from the mine, which is operated by Knife River Coal Mining Co., will be used in the Sidney steam-electric plant of Montana-Dakota Utilities Co.

The around-the-clock operation is a new industry for the Sidney area. A dragline and a seven-cu-yd bucket mine 20 carloads of coal each day, which are transported by rail to the power plant.

Coal Pipeline

Consolidation Coal Co.'s 108-mi coal pipeline between Georgetown and Eastlake, Ohio, is now in full operation. It took almost two yr after its completion to iron out the bugs from this pioneer venture, but in the last few months successful operation in excess of planned capacity has been accomplished.

A joint undertaking of Consol and Cleveland Electric Illuminating Co., the \$13.5 million venture is by far the longest solids-transporting pipeline in the world. The experience gained in bringing about this success will be very valuable to future builders of solids-transporting pipelines.

The coal is transported as a slurry—

September, 1958 • COAL AGE

News Roundup (Continued)

BEST FOR THE LONG HAUL
-best for extensibles-

SCANDURA

MINE BELTING

● **STRONGER**
● **LIGHTER**
● **MORE DURABLE**

...moves more tons
—more years



Manufactured in
CHARLOTTE, NORTH CAROLINA

by

SCANDINAVIA BELTING COMPANY

Offices: Newark 1, N. J.

Exclusive Distributors for the Mining Industry
East of the Mississippi

SCANDURA Gold Line Mine Belting—acceptance designation "Fire Resistant U.S.B.M. 28-1"—is more productive because it stays on the job longer without expensive repair. Solid-interwoven, SCANDURA takes a beating without tearing or ripping. With no plies to separate, this great belting is highly flexible—small pulleys can't damage it. Lighter, less bulky SCANDURA trains perfectly, troughs naturally whether empty or loaded, has *two top sides*—thanks to its polyvinyl impact cushion on both faces. • Talk belting with your National Mine man . . . then let SCANDURA Gold Line speak for itself!

**National Mine
Service Company**



564 Alcoa Building • Pittsburgh 19, Pennsylvania

All-State Division	Ambridge Division	Ashland Division	Seneca Division	Clarkson Division	Greensburg Division
Logan, W. Va.	Ferry Port, Pa.	Ashland, Ky.	Berkley, W. Va.	Nashville, Ill.	Greensburg, Pa.
Kentucky-Virginia Division	Western Kentucky Division	Whitesboro Division	Mountaineer Division		
Jenkins, Ky.	Madisonville, Ky.	Indiana, Pa.	Morgantown, W. Va.		

Another Continental first



Belt-Powered Hydraulically Operated Tripper

Developed entirely by Continental, this patented hydraulic tripper was specifically designed for handling explosive, corrosive or similar materials where electric trolley wires and cable reels would present a hazard. Elimination of electrical equipment and mechanical reversing mechanisms, together with their required maintenance, make it an attractive installation for handling all bulk materials.

The unit, fully equipped with hydraulic controls, receives power from the conveyor belt and transmits this power through a hydraulic system to the tripper wheels. There are no clutches or friction drives to corrode during down time. The hydraulically operated spring-set brakes provide tripper positioning without creep, crawl, or accidental release.

Consult your nearest Continental office for complete information.

- On any conveying or materials handling problem, consult your nearest Continental office.



INDUSTRIAL DIVISION

Continental Gin Company

BIRMINGHAM, ALABAMA

ATLANTA • DALLAS • KNOXVILLE • MEMPHIS • MOBILE • NEW YORK 17

News Roundup (Continued)

a thick liquid comprising finely ground (less than 1/8-in) coal and water in equal proportions. It is prepared at Consol's Georgetown plant and sent through the 10 1/2-in line by a pumping station at Georgetown and two others spaced along the line. Arriving at Eastlake, the water and coal are separated and the coal dried for use in Cleveland Electric furnaces—the water is purified and discarded into Lake Erie.

Cleveland Electric has contracted to buy 18 million tons of coal in 15 yr and already reports "substantial savings" through use of the pipeline.

NCA Torpedos Oil

Foreign oil imports may be in for trouble if the National Coal Association succeeds in convincing government regulatory agencies that the coal industry has been hurt by the oil imports.

Tom Pickett, executive vice-president of NCA, stated that "The new Trade Agreements Extension Act just approved by President Eisenhower contains a clear mandate from Congress to relieve essential industries like coal from the damage done by foreign imports [like oil]." Reasoning from this premise, Mr. Pickett and his staff are gathering current data to show how unrestricted imports of foreign residual oil have continued to flood coal's normal markets since 1954.

Industrial consumers who might have burned about 57 million tons of coal last year were lost to foreign oil imports. According to Mr. Pickett, this loss represents more than 24,000 jobs for American coal miners.

Under the terms of the newly-signed reciprocal trade law, coal is an essential industry and is being adversely affected by the oil imports. Mr. Pickett stated that "The government has no alternative but to restrict the heavy flow of foreign oil into coal's traditional markets."

Mines, Companies

A new coal field is to open in the Nucla, Colo., area.

Office-lab-shop facilities are already under construction for Edna Coal Co. of Denver. The operation is expected to supply 100 to 300 tpd starting in January to the new 37,500-kw Colorado-Ute steam power plant now under construction at Nucla.

Susquehanna Collieries will end all mining — 125 men laid off at No. 30 slope of Glen Lyon Colliery.

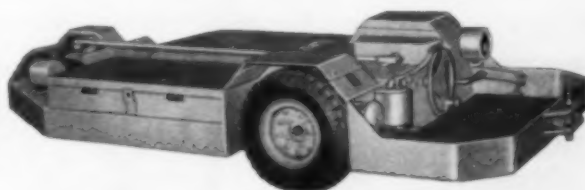
Susquehanna Collieries Div. of M.A. Hanna Coal Co. will end all mining op-

Ask anyone who owns **KERSEY** MINE HAULAGE EQUIPMENT

HOW you get greater payload at less cost...



NEW — Model 744
Under normal conditions this tractor is capable of hauling a 20-ton payload!



Model HT-8
Specially designed for use in operation where bottom conditions are normal — this rubber-tired tractor vs. rail will earn 75 cents more per ton!

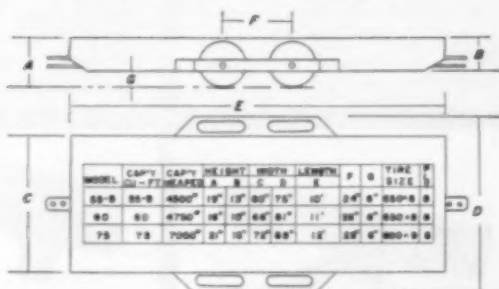
HOW you can choose cars to fit size of mine

Model 60, 2-ton car — for coal seams under 30" high

Model 55-B, 2-ton car — for coal seams 30" and higher

New Model 75, 3½-ton car — for higher capacity mines

Patent No. 2,793,603
For Tandem Coal Car



HOW Kersey helps you with special mining problems

designs and builds a complete line of mine haulage equipment including — tractors, rail-locomotives, tandem coal and supply cars, battery charging equipment and a complete stock of batteries.

If you want to see for yourself how Kersey Equipment does an outstanding high production, low-cost haulage job — ask us for the name of the operator nearest to your mine.

KERSEY MANUFACTURING CO., Inc.

BLUEFIELD, VIRGINIA

When you want modern equipment for modern haulage and want the best — **CHECK WITH KERSEY FIRST!**



CUT COSTS WITH THE NEW
VIC-EASY®
METHOD OF JOINTING
LIGHTWEIGHT PIPE

SAVE UP TO 60% IN PIPING COSTS!

Now there's no need to buy overweight pipe. Thanks to Victaulic engineering, you can select lightweight pipe "job-rated" to your conditions and install it the new VIC-EASY way. You'll cut costs of pipe, transportation, and handling—you'll save from 30% to 60% in man-hour installation.

 <p>1. LIGHTWEIGHT PIPE in thicknesses from .065" handles high pressures. Leading mills make sizes 1 1/4" to 12", steel or aluminum, with VIC-EASY roll-grooved ends.</p>	 <p>2. VIC-EASY PORTABLE GROOVER rolls grooves into pipe in seconds. Manually or power-operated, this groover removes no metal...retains full wall thickness.</p>
 <p>3. VICTAULIC SNAP-JOINT COUPLING assembles and locks by hand—no wrenches or tools required. Other bolted styles of Victaulic Couplings alternately usable.</p>	 <p>4. VICTAULIC FULL-FLOW FITTINGS team up with our couplings and lightweight pipe to provide a complete VIC-EASY system...cuts costs of installation and operation.</p>

For complete information write for Bulletin AA9

VICTAULIC COMPANY OF AMERICA
 P.O. BOX 509 • Elizabeth, N. J.

Mines, Companies (Continued)

erations, even on the coal land it recently bought from Glen Alden Corp., and instead will lease out its land to other mining companies. It is expected that Susquehanna will confine its activities to preparing and selling the coal mined on its land. The Shamokin-Newport Coal Co., which leased the No. 30 slope, confirmed the idling of the men due to high operating costs and the worked-out condition of the mine.

A cost survey for the proposed steam power plant in the Roslyn-Cle Elum area of Washington State has been completed.

The results of the survey show that steam-electric power would be economically competitive with the hydroelectric power produced in the area, provided the steam-electric power could be sold in conjunction with secondary power obtained from the Bonneville Power Administration. Construction on a 250,000-kw steam plant is tentatively slated to begin in 1960 with completion expected in 1963. The plant will burn coal leased from Northern Pacific Railroad Co.'s Cle Elum properties by the Kittitas County Public Utilities District.

Dominion Coal & Steel Co.'s problem is a tourists' delight.

A one-million-ton coal bank at Sydney, Nova Scotia, which piled up because of slack business, has become quite a tourist attraction.

The Thompson Creek No. 3 mine near Carbondale, Colo., has gone back into operation after a 30-day shutdown.

A resumption in coal demand by U.S. Steel Corp. has caused the resumption of work. The original closure resulted from a union jurisdictional struggle.

Associations

The Mining Electro-Mechanical Maintenance Association has announced the results of its annual election for Central Advisory Council officers and members of the executive committee.

The new president is Myles E. Altimus, U.S. Steel Corp. First, second and third vice-presidents in order are: Chester S. Conrad, Mountaineer Coal Co.; Robert A. Huth, Universal Welding & Metals, Inc.; and Harry J. Young, Cooke-Wilson Electric Supply Co.

Robert R. Williams Jr., manager of mines for Colorado Fuel & Iron Corp., has been elected president of the Rocky Mountain Coal Mining Institute.

Williams, with CF&I since 1925, succeeds Robert M. Von Storch of Columbia-Geneva Steel Div., U.S. Steel Corp.



Companions in Coal Production

While a Marion 7800 walking dragline (background) strips overburden, its companion, a Marion 4161 shovel, loads coal at a vast bituminous stripping operation in southern Indiana. Overburden of clay and shale measures 40 to 85 feet in depth, and the coal seam averages six feet in depth. Swinging a 35-yard bucket on a 195-foot boom, the big walker moves an average of 550,000 yards per month. The electrically-powered loading shovel has a 7½-yard dipper.

CONSULT

MARION

MINING SPECIALISTS

for lowest costs on your property!

MARION POWER SHOVEL COMPANY—MARION, OHIO, U. S. A.

A Division of Universal Marion Corporation



The smaller Marions handle big tonnages, too! At a Canadian ilmenite smelter, this 111-M clamshell uses a 3-yard bucket for ore and a 6-yard bucket for coal.

The Conference decided that hydraulic
excavation should be made the principal

CRUSH

Coal Abroad

German Coal Glut

Mounting coal stocks in West Germany have brought about both industry and government action in an attempt to ease the situation. With approximately 10 million tons of unsold pithead coal, industry has begun to declare miners' holidays and the West German government has acted to restrict fuel in ports, while easing exports.

Some 60,000 miners in the coal-rich

Saar have already had a one-day holiday, which resulted in a 55,000-ton production loss. Similar measures may be repeated in West Germany in order to cut down the daily increase in stocks of about 50,000 tons. The Ruhr mining industry has also stated that modernization efforts to cut costs will be continued.

The West German government acted by stipulating a maximum delivery period of 18 mo on coal and fuel contracts, instead of the 3 yr previously

allowed. Also, it decreed that solid fuels imported from the "dollar area" may be re-exported in the future to countries outside the six-nation ECSC.

If these actions are not effective, public ownership of the coal mines as proposed by the Social Democratic Party, may be on its way.

Japan

Hunts for New Coal Sources

Representatives of Japanese steel companies continue their search for new coal sources. At present, Japanese steel mills import about 3 million tons of bituminous coal annually, of which 2.7 million tons comes from the U.S. However, freight charges of \$8 per ton for U.S. coal have made the steel companies very interested in switching their major source.

Australian coal, with a freight charge of less than \$5 per ton, seems to interest the Japanese greatly. Large deposits of high-quality bituminous coal recently discovered in New South Wales, Australia have been sample-tested by Fuji Iron & Steel Co. with success. A Japanese survey mission is to be sent to Australia in the near future to investigate the possibility of importing coal. If this works out, the cost of Japanese steel production will be considerably reduced.

In mid-August the Japanese sent a commission to Alaska to investigate possibilities of importing coking-grade coal from the undeveloped Bering River coal field.

Argentina

Polish Coal Bought

Negotiations with Poland for the purchase of 2 million tons of coal have been successfully concluded. Shipment at the rate of 50,000 tons monthly will start immediately. Payment for the coal is to be made out of Argentine credits in Poland and future exports of Argentine products.

Even though the prices reported are said to be among the lowest paid for bituminous coal, Poland is believed to have made an excellent deal because growing world coal stocks may soon result in considerable price cuts.

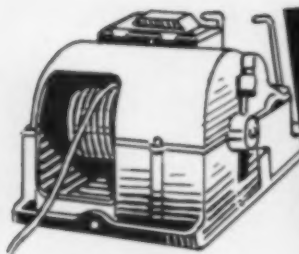
Meanwhile negotiations are continuing for the purchase by Argentina of Chilean coal.

Red China

Hydraulic Mining Urged

The Red Chinese are switching to hydraulic mining. Peking radio said that the National Conference on Coal Mining has decided to introduce hydraulic mining in China on a large scale.

If YOU are STILL loading by the Ancient ROPE-and- HOIST Method...



Your Loading Point
EFFICIENCY is hanging
at the end of a WEAK
and COSTLY Thread!

**There's a BETTER
and LESS EXPENSIVE WAY of LOADING
COAL... with STAMLER CAR SPOTTERS!**

You can't afford to be efficient at the face and lose money at your loading point. Competitive modern mining must be efficient in EVERY part of the mine! So why not have modern barney equipment that PAYS FOR ITSELF in a short time? Why not install the equipment that will load the MOST coal for you at the LEAST cost? That means STAMLER Car Spotters. STAMLERS get the coal out faster, more efficiently, and at less cost

than by ANY OTHER METHOD.

And with smooth-running hydraulic STAMLERS parts replacement costs are not even worth mentioning. We can PROVE to you that STAMLERS will pay for themselves in a short time!

STAMLER
Hydraulic
CAR SPOTTERS

W. R. STAMLER CORPORATION
PARIS, KENTUCKY

SCHROEDER BROTHERS, Exclusive Eastern Sales Agent
Pittsburgh, Pennsylvania
UNION INDUSTRIAL CORP., Carlsbad, New Mexico

SALMON & CO., Birmingham, Alabama
WESTERN SALES ENGINEERING CO.,
Salt Lake City, Utah

The Conference decided that hydraulic mining should be made the principal method in developing the coal industry, and naturally, representatives of the major collieries went along with this "suggestion." Most major mines are expected to make the change by the end of 1959.

OVERSEAS FLASHES

POLAND—The price of pulverized coal is so low that it can compete with petroleum. In fact, Swedish cement and cellulose manufacturers are said to be considering converting from oil to pulverized coal, using Polish sources.

INDIA—A plant to manufacture coal industry equipment with a production capacity of 30,000 tons will be built with Russian aid. Estimated cost is \$31.5 million.

CZECHOSLOVAKIA—The precarious solid fuel conditions in this country have forced the government to exploit all fuel sources, even at high cost. Subsoil gasification of hard-to-get brown coal deposits in Czechoslovakia are scheduled to start in 1959. Tests have already begun. The gases are to drive turbines in an electric power plant.

CHINA—Equipment for a new coal hydrogenation plant will arrive here shortly from Russia. Located in Fushun, the new plant will use bituminous coal from rich fields recently uncovered in the vicinity. Pilot plant tests are claimed to give 60 barrels of motor oil, fuel oil and allied products from 100 tons of coal.

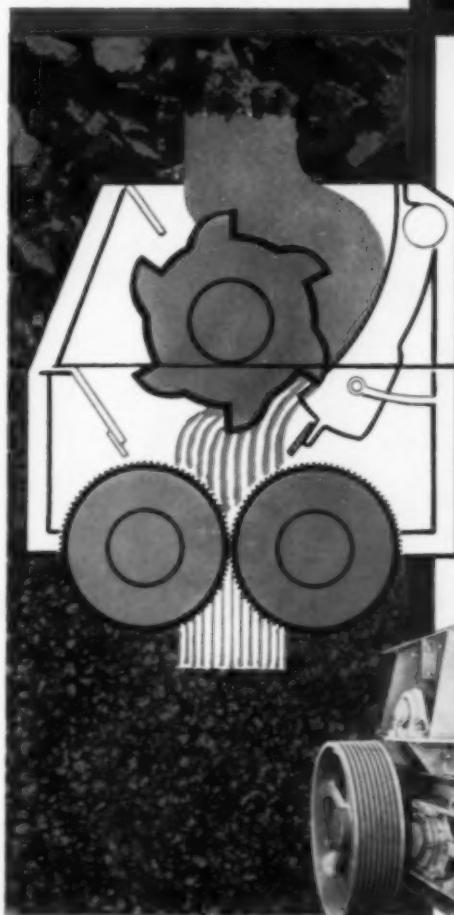
ITALY—Coal consumption here decreases steadily while the use of liquid and gaseous fuels increases, reports the Italian Coal Merchants Association. This, plus the lifting of coke duties and increased market competition, is hurting Italian imports of U.S. coal.

FRANCE—French coal imports dropped sharply in the second quarter of 1958 due to large stocks on hand at French mines. In the first quarter of 1958, France imported 4,650,000 tons of foreign coal while in the second quarter of the year imports dropped to 3,884,000 tons. Imports from the U.S. went from 1,226,000 tons in the first quarter to 761,000 in the second.

RUSSIA—A recent Russian conference on the development of Siberia indicated that coal output there will be greatly increased in the next few years. Siberian coal output will double by 1965, according to the Soviets, in line with a shift of industries needing heat and electricity to that area.

CRUSH RUN-OF-MINE TO FINE SIZES

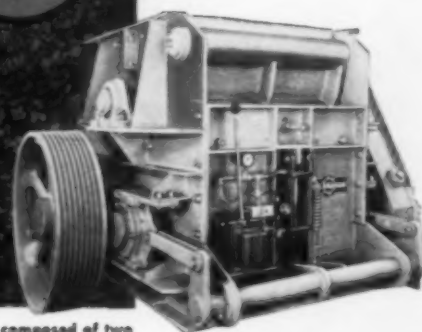
IN THIS
TWO STAGE
UNIT



With a ratio of reduction greater than ever before available, this single two-stage unit does the work normally assigned to two crushers. A unique hydraulic system allows changing product size without stopping the crusher, and also protects against tramp iron.

Get All the Facts—

Ask for
Bulletin BDTR-57



The McLanahan Triple Roll Crusher is composed of two elements—a primary single roll crushing against curved crushing plate; and double roll secondary performing the final reduction.



TRIPLE ROLL CRUSHER

McLANAHAN AND SONS CORPORATION, Independence, Mo.



Latest Stoper Drill Development Simplifies Roof Bolting in Low Coal

Le Roi-Cleveland S-20 Vac-Nu-Matic stoper, with new feed principle, is only practical machine in seams from 36" down to 26". Other sizes available for any seam height.

28-inch feed S-20 weighs only 65 pounds. It is the lightest dust-collecting type stoper available—operators say it's easier to use.

The revolutionary S-20 stoper is designed especially to provide a better way of producing roof-bolt holes.

Low coal or high coal makes no difference to this machine. It lets you put your roof-bolts wherever you need them—even in 26-inch coal. And high drilling speed along with light weight and a positive dust-collection system helps your miners get the work done faster.

New feed principle provides low overall height and longer travel. The S-20's feed consists of an air piston combined with a chain in such a way that the travel of the machine is double the travel of the feed piston. As a result, it drills a deeper hole with one steel change than a standard stoper does with two changes.

Because it does away with at least one steel change and in some cases two, this longer travel saves roof-bolting time.

The low overall height is obtained because the S-20 is the only stoper that starts its feed at the bottom of the machine. The starting height, regardless of feed length, is always 16½ inches.

Dust collection is instantaneous. There are no hoods or tubes to handle or adjust, when your miners use the S-20 Stoper. The cuttings and dust are pulled through the drill steel instantaneously and ejected through the side of the chuck housing into the dust box—no cuttings go through the machine itself.

There's complete absence of dust because the S-20 system pulls a high vacuum. It uses only 18 cu. ft. of air at 80 lbs. pressure to pull a static vacuum of 16½ inches of mercury or a fluid vacuum of 13

inches while the machine is running. Wet top presents no problem.

New design speeds roof-bolting operation. The S-20 has been in the field for more than a year, working in all types of coal mines. According to the evidence piled up during this period, S-20 users not only roof-bolt areas heretofore impossible to get at—they also do the work faster.

Features that contribute to this increase in efficiency are: Lighter weight. Low overall height. Longer feed. Positive dust-collection. Fast drilling speed.

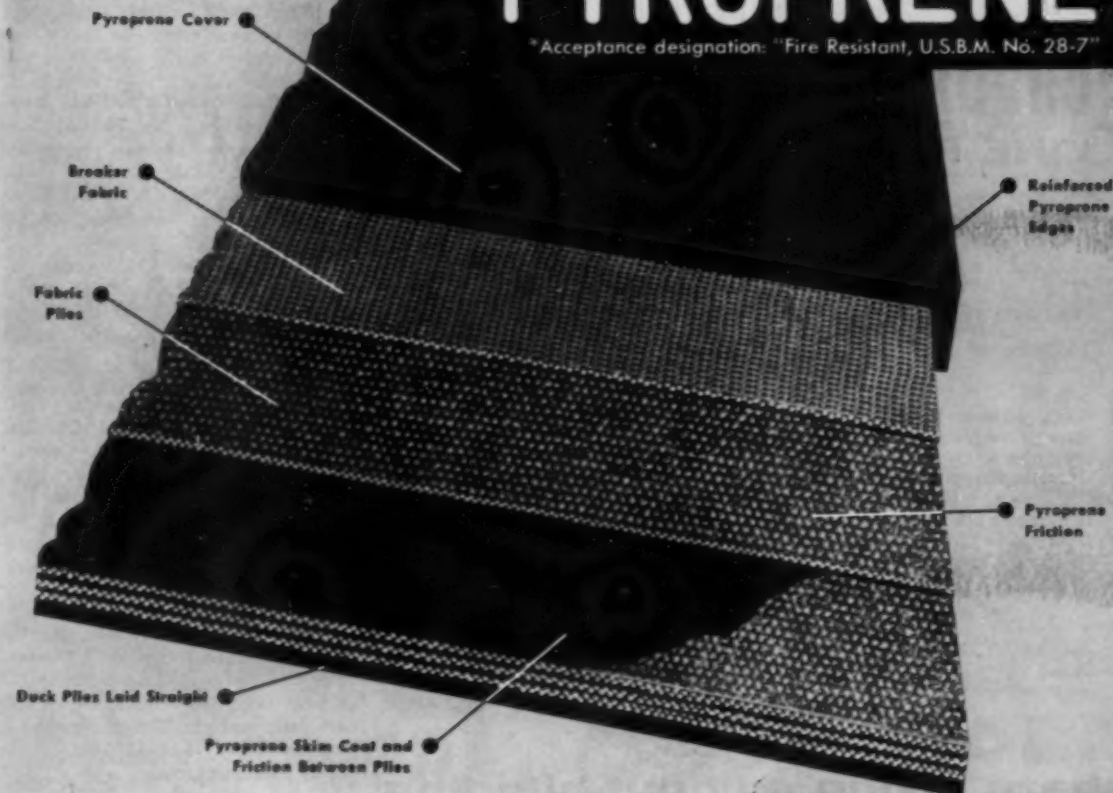
Test the S-20 in your mine. See how it reduces roof-bolting costs. A demonstration can be arranged by contacting Schroeder Brothers, 3116 Penn Ave., Pittsburgh, Pa.; Acme Machinery Co., Williamson, West Virginia; Equipment Service Co., Inc., 617 North 9th St., Birmingham, Alabama. Or, you can contact us direct.



LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

PYROPRENE*

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-7"



What happens if fire penetrates to the carcass of a conveyor belt?

It goes out if it's a Hamilton Pyroprene belt. Fire just can't find fuel to feed on in this U.S.B.M.-accepted belt because every element is "Pyroprene Protected". The cover is all Pyroprene. The fabric plies and the breaker fabric are completely encased with 100% Pyroprene compound before the belt is built. In addition to fire resistance,

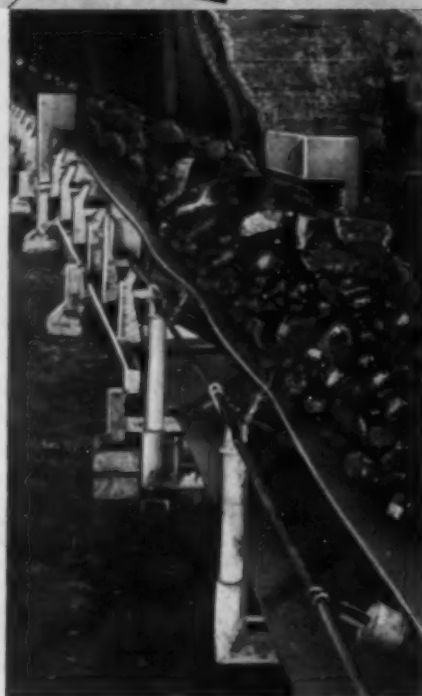
Pyroprene belting offers exceptional durability and strength. The cover will give maximum resistance to cuts, tears, gouging and abrasion; reinforced edges protect carcass at critical wear point. Breaker fabric acts as cushion for impact. Fabric plies are strength members. Skim coats increase adhesion and prevent ply separation. Write Dept. MI-105.

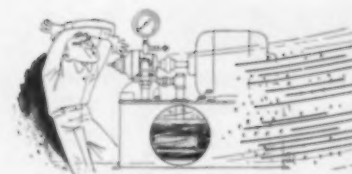
Serving Industry since 1870
Hamilton Rubber

MANUFACTURING CORPORATION, TRENTON 3, N. J.

A Division of Acme-Hamilton Manufacturing Corporation

ATLANTA • CHICAGO • HOUSTON • PITTSBURGH • INDIANAPOLIS • LOS ANGELES • NEW YORK • SAN FRANCISCO





SCHROEDER LINE FILTERS

Your hydraulic system operates in a storm of harmful dirt particles, both from the air surrounding your system and from dirt particles generated, through wear, within the system itself.

Increase your operating efficiency...

Schroeder Line Filters increase your hydraulic system operating efficiency economically! Harmful, minute dirt particles, which can pass through the standard mesh strainer in your system, are filtered out and prevented from wearing out pumps, valves and machine components. Operating temperatures are lowered... hydraulic fluid life is extended... corrosive action is minimized! Schroeder Line Filters, with their replaceable filter elements, can remove particles as small as .000118 inch from your hydraulic system.

SCHROEDER BROTHERS CORPORATION

Nichol Ave., Box 72, McKees Rocks (Pittsburgh District), Pa.
HYDRAULIC • ELECTRIC and PNEUMATIC EQUIPMENT

Optional Spin-Dicator provides visual supervision of performance.



How Link-Belt electrically heated CA vibrating screens achieve sharp sizing without blinding



FOUR LINK-BELT CA VIBRATING SCREENS size coal at preparation plant of Kentucky mine. Electric screen heater on second unit prevents blinding of cloth when handling fine coal.

SPRING CONTROLLED centrifugal weight type counterweight assembly eliminates excessive resonant motion (bouncing) of the screen while starting and stopping.



The smooth, powerful Concentric Action of Link-Belt CA vibrating screens assures fast, accurate sizing of all kinds of coal. And the Link-Belt electric screen heater prevents plugging and blinding of screen cloth... provides top performance when handling fine coal and other hard to screen materials.

One-deck, two-deck and three-deck CA screens are available in sizes from 4 to 6 feet wide by 8 to 14 feet long for a wide range of coal sizes. For additional information, call your nearest Link-Belt office. Or write for Book 2554.

LINK-BELT

VIBRATING SCREENS

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 20, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1. To Serve Industry There are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, São Paulo; Canada, Scarborough (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,877

Preparation Facilities

Critical Fork Coal Co., Norton, Va.—Contract closed with Daniels Co., Contractors, Inc. for a complete new preparation plant including a DMS dense media washery to wash 4x% ROM coal. Completion expected in August 1958.

Carrs Fork Coal Co., Allock, Ky.—Contract closed with Daniels Co., Contractors, for a complete new preparation plant including a DMS dense media washery to wash 5x3/8 ROM coal. Completion expected in September 1958.

Lake Superior Coal Co., Superior, W. Va.—Contract closed with Kanawha Mfg. Co. for dust collection system for preparation plant including American Air Filter Amer-Clone dry dust collector—56,000 cfm capacity.

Semet-Solvay Div., Allied Chemical & Dye Corp., Tralee, W. Va.—Contract closed with Eimco Corp. for water clarification equipment consisting of two vacuum filters and a refuse thickener for handling froth and tailings from flotation cells. Solids to be 100x0 mesh. completion expected in late 1958.

Cornell Coke Co., Sabraton, W. Va.—Contract closed with Deister Concentrator Co., Inc. for three Conenco "77" diagonal deck coal washing tables with twin decks and one Conenco revolving feed distributor Model 108 to handle 1/4-in bituminous coal.

Pocahontas Fuel Co., Inc., Pocahontas,

Bituminous Output

YEAR TO DATE	PRODUCTION
Aug. 9, 1958	228,900,000
Aug. 10, 1957	298,960,000
1958 output 23.4% behind 1957.	
A month earlier output was 24.0% behind 1957.	

WEEK ENDING	PRODUCTION
Aug. 9, 1958	7,890,000
Aug. 10, 1957	9,588,000

Anthracite Output

YEAR TO DATE	PRODUCTION
Aug. 9, 1958	12,572,000
Aug. 10, 1957	15,580,000
1958 output 19.3% behind 1957.	
A month earlier output was 20.1% behind 1957.	

WEEK ENDING	PRODUCTION
Aug. 9, 1958	411,000
Aug. 10, 1957	509,000



Just two minutes to permanence!



USS Tigerweld BF-10 Bonds go on quickly...



will last indefinitely



Just tap the terminals on the track base—then weld. You don't need clamps. The BF-10 goes on quickly and easily and is held by an all-steel weld, the strongest you can make. The strand and terminals are joined by a butt-weld, a feature of all TIGERWELD bonds. These heavy-duty terminals will stand up under a heavy pounding. In fact, the entire bond has exceptional fatigue strength which enables it to withstand unusually high stresses.

BF-10 Rail Bonds have reversible terminals. You can place the strand on top of the rail base, or under the rail base, out of the way and protected from damage. These durable bonds are also tough enough to be removed and used again.

The BF-10X Cross Bond. Companion of the BF-10, this cross bond features the convenient self-clamping terminals which have made the BF-10 so popular. Equally rugged and dependable, it can also be reclaimed for additional service.

USS and Tigerweld are trademarks



NEW CATALOGUE—Our latest revised catalogue gives complete details on all Tigerweld Power Bonds. Write today: American Steel & Wire, Rockefeller Building, Cleveland 13, Ohio.

**American Steel & Wire
Division of**



United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors • United States Steel Export Company, Distributors Abroad

X MARKS THE CRITICAL SPOTS!



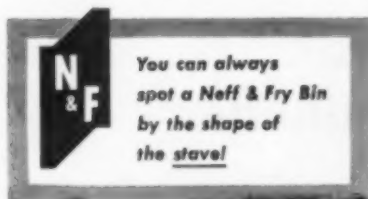
**It takes
more than muscles to
build a storage bin**

Before the physical work of building a bin begins, we must know the problems involved at the Three Critical Points.

- X What is the loading problem?
- X What are the characteristics of the material to be stored ... and its "flowability"?
- X What is the volume and rate of discharge?

When planning your next storage bin, may we sit in on the very early stages of planning?

NEFF & FRY COMPANY
320 Elm St., Camden, Ohio



Preparation Facilities (Continued)

W. Va.—Contract closed with Deister Concentrator Co., Inc. for two Concenco "77" diagonal deck coal washing tables with twin decks to handle 1/4-in bituminous coal.

Bolt Mining Co., Putt Siding, W. Va.—Contract closed with Deister Concentrator Co., Inc. for four Concenco "77" diagonal deck coal washing tables with twin decks to handle 1/4-in bituminous coal.

Oakwood Coal Co., Pine Grove, Pa.—Contract closed with Deister Concentrator Co., Inc. for one SuperDuty diagonal deck No. 7 single deck coal washing table to clean pea and No. 1 buck sizes anthracite coal.

Wisconsin Steel Div., International Harvester Co., Benham, Ky.—Contract closed with Link-Belt Co. for an automatic coal preparation plant to wash, dry and screen 400 tph of run-of-mine coal. Equipment such as concentrating tables, water clarifiers including a Link-Belt 70-ft circular thickener and disk-type vacuum filter, and an air-pulsated wash box will be used. Completion is expected in early 1959.

New Books

Coal Economics

The Economics of the Coal Industry, by Hubert E. Risser. This volume is a study to determine past and present changes in the bituminous coal industry of the United States and to analyze the economic implications of these changes. Segments of the industry receiving particular attention are structure of the industry, especially size of operating units; production and consumption; technology, including methods, equipment and productivity with various equipment and methods; employment by method, by different sizes of company and by occupation; and geographic location of the industry. The study covers changes during the years 1903-1953.

As a result of the study, the author reaches the following conclusions:

1. Production of coal is likely to expand and become more stable.
2. There is a decided trend toward large-size producing units.
3. Mechanization will increase.
4. As mechanization increases, productivity will increase.
5. Eventual exhaustion of strippable coal is inevitable, but that time is in the indeterminate future.
6. No drastic change in the coal production center is likely to occur for many years; however, shifting population

Here's How... to make a PROFIT from COAL FINES



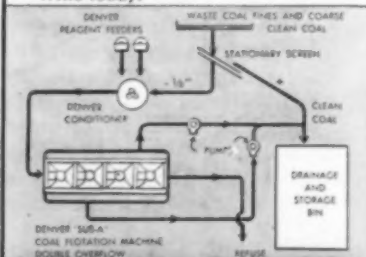
with
**DENVER "Sub-A"
COAL FLOTATION**

Simple...Low Cost!

You can handle coarse coal ($-1\frac{1}{2}'' \times 0''$) at the head of your circuit in DENVER "Sub-A" Flotation Machine. You save coarse as well as fines in a coal product which is easily dewatered! You have simple, low-cost system.

Over 90% of all coal flotation plants in U. S. are Denver "Sub-A", an outstanding testimonial to DECO's experience, engineering "know-how" and equipment.

DECO can provide complete testing, engineering service, flow-sheet design and all equipment for your coal flotation plant. One source of supply, one responsibility. Write today!



**DENVER
EQUIPMENT CO.**
1400 Seventeenth St. Denver 17, Colorado

An Important New Development...

The **LONG** *Lo-Rope* **BELT CONVEYOR**



Patents Pending

Offers Lower first cost—less
maintenance • Easier installation • Self-
training • Higher capacity—less spillage!



In this unique design, the wire rope is located below the carrying belt and carrying idlers and the motion of the belt rocks the idlers in the direction of belt travel to provide automatic self-training. This feature, combined with the belt's deep 27° troughing angle, keeps the load centered at all times, materially reduces spillage, makes possible wider spacing between idlers, and provides high carrying capacity.

Adjustable height "Platform Rocker" rope support stands minimize blocking and level belt automatically.

There are other reasons why it will pay you to use the LONG Lo-Rope Conveyor. This unit requires an absolute minimum of maintenance and is designed to give long, dependable service under all conditions. We'll be glad to send complete details without obligation.

For full information on LONG Lo-Rope Belt
Conveyors or a demonstration, write us today

The

LONG

Oak Hill, W. Va.

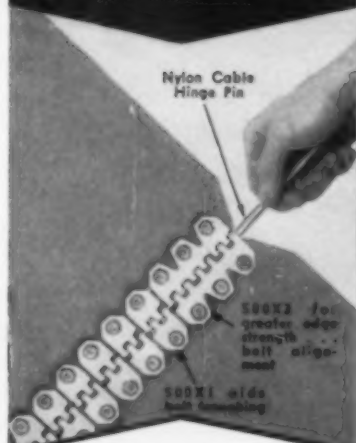
Company

WHERE SPEED
COUNTS...

USE

FLEXCO

**HINGED 500X
BELT FASTENERS**



UNDERGROUND COAL MINING

THE IDEAL FASTENER FOR JOINING EXTENSION BELTS. DESIGN PERMITS THE USE OF A SMALLER FLEXIBLE NYLON CABLE HINGE PIN FOR SMOOTHER, TIGHTER JOINTS.

NYLON CABLE HINGE PIN . . .

- ✓ Easy to insert or pull out . . . will not migrate.
- ✓ Smooth wearing surface—nylon is self-lubricating.
- ✓ Will not unravel when cut.

Start now to equip your extension belts with FLEXCO 500X "SEPARABLE" FASTENERS (new FLEXCO HINGED 500X FASTENERS are interchangeable with old HF 500 Fasteners).

HANDY PACKAGE



Carton contains one complete belt joint—fasteners, pin, bolts and nuts.

ORDER FROM YOUR DISTRIBUTOR
OR WRITE TO . . .

Flexible
STEEL LACING COMPANY

4638 Lexington St. • Chicago 44, Illinois

New Books (Continued)

and industries will cause expansion in the West and South.

Included in the text are 65 tables and 11 figures. An 8-page appendix presents a graphic analysis of coal industry economics. 177 pp, including appendix and bibliography. 6½x9½-in; cloth. \$3, Bureau of Business Research, University of Kansas, Lawrence, Kansas.

USSR Special Mining Techniques

Special Mining Techniques is Appendix 6 of the report of the technical mission of the National Coal Board on The Coal Industry of the USSR. It describes hydraulic mining, hydraulic mining with pulsed infusion shotfiring, and flexible sectionless shield support working. The complete report is issued in seven volumes as follows:

	Price
The Report (Part I)	8/3
Appendixes (Part II) comprising	
Appendix 1—Shaft Sinking and Roadway Development	3/-
" 2—Coal Cutting and Loading	5/6
" 3—Mine Hazards	2/6
" 4—Roof Supports	5/6
" 5—Training	3/6
" 6—Special Mining Techniques	3/-

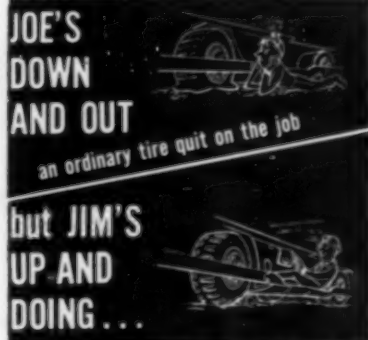
43 pp. 6x9½-in; paper. Printed in England by Waterlow & Sons Limited, 49 Parliament St., Westminster, London, S. W. 1.

Dust Explosion Hazard

Standard for Prevention of Dust Explosions in Coal Preparation Plants, NFPA No. 653 is a new standard covering building construction and arrangement for plants producing conditioned coal for firing boilers or power plants. It also gives details on how to prevent dust explosions, and equipment for screening, crushing, pulverizing, drying and conveying the treated coal. Prepared by the National Fire Protection Association committee on dust explosion hazards, the standard was adopted at the Association's annual meeting. 20 pp. 50¢, National Fire Protection Association, 60 Batterymarch St., Boston, Mass.

Personnel Problems

How to Supervise People, by Alfred M. Cooper is the fourth edition of this work and has been revised to take account of changing conditions under which today's supervisors must direct their subordinates. It covers all the typical problems of hiring, discipline, preventing accidents, promoting teamwork, delegating authority and labor relations. Question material that suits the book for conference training is in-



but JIM'S
UP AND
DOING . . .

with **U.S. ROYAL**
Mine Cushion TIRES

YOU SHOULD KNOW these great U. S. Royals have moved millions of tons with no downtime due to tire failure. Yet they cost no more. Write J. A. Watson, Mgr., Industrial Tires now!



United States Rubber
Rockefeller Center, New York 20, N. Y.

HINGED PLATEGRIP
BELT FASTENER No. 500

**FOR HEAVY CONVEYOR BELTS
OF CHANGING LENGTH**

These heavy-duty belt fasteners make a strong, flexible joint in conveyor belts, belts of any width and of from ½" to ½" thickness. They offer special advantages in mines, quarries or industrial setups where length or position of belt is frequently changed, because sections can be removed or added at will. Joints are opened for this purpose by simply pulling out the hinge pin.

Easily and quickly applied on the job or in the shop. Special design gives deep compression into belting and smooth, flush joint.

Write for Circular



ARMSTRONG-BRAY & CO.
5340 Northwest Highway CHICAGO 30, U. S. A.

cluded. 264 pp. 5½x8-in; cloth. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

Antitrust Policies

Antitrust Policies: American Experience in Twenty Industries, by Simon N. Whitney, is a new Twentieth Century Fund study which examines the workings of antitrust legislation and lists three specific effects:

1. An important contribution has been to set up a barrier against the cartelizing of American industry.

2. Without the antitrust laws there would doubtless be more attempts to create monopolies.

3. A third contribution of the antitrust laws is to help maintain both equality of opportunity and freedom of entry in industry.

The bituminous coal industry is one of the eight major industries studied in depth. Two volumes, 1101 pp. 6½x9½-in; cloth. \$10. The Twentieth Century Fund, 41 E. 70th St., New York 21, N. Y.

Meetings

Mining Electro-Mechanical Maintenance Association; 6th annual general meeting and banquet, Central Advisory Council, Sept. 27; Summit Hotel, Uniontown, Pa.

American Institute of Mining, Metallurgical and Petroleum Engineers, Inc.; Solid Fuels Conference, October 9-10, Chamberlain Hotel, Old Point Comfort, Va.

American Society of Mechanical Engineers-American Society of Lubrication Engineers; 5th Annual Joint Lubrication Conference, October 13-15, Statler Hotel, Los Angeles, Calif.

National Safety Council; Coal Mining Section of the National Safety Congress, October 20-22, Chicago, Ill. Write R. L. Forney, Secretary, National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., for information.

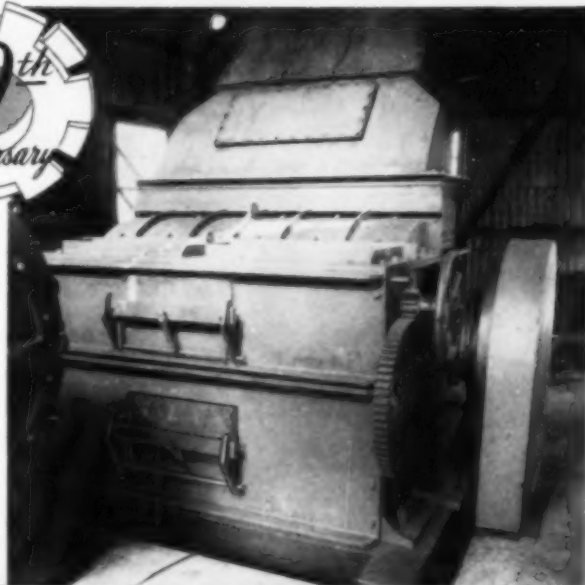
Illinois Mining Institute; 66th Annual Meeting, October 24, Hotel Abraham Lincoln, Springfield, Ill.

American Institute of Mining, Metallurgical and Petroleum Engineers, Pittsburgh Section; 13th Annual "off-the-record" Meeting, November 7, Penn-Sheraton Hotel, Pittsburgh, Pa.

University of Missouri School of Mines and Metallurgy-U. S. Bureau of Mines; 4th Annual Symposium on Mining Research (dealing mainly with ammonium nitrate explosives this year), November 13-15, Rolla, Mo.

CRUSHING FACTS

from *American* PULVERIZER CO.



USER REPORTS

"We've reduced 2,521,000 tons of 2" N & S coal to a ¾" product. Crusher has given satisfactory service. Rings and screens have been renewed only once."

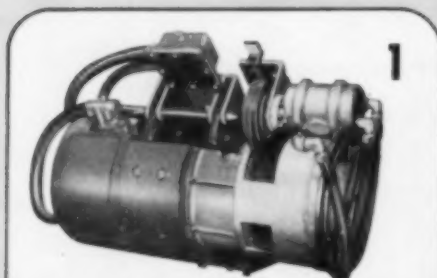
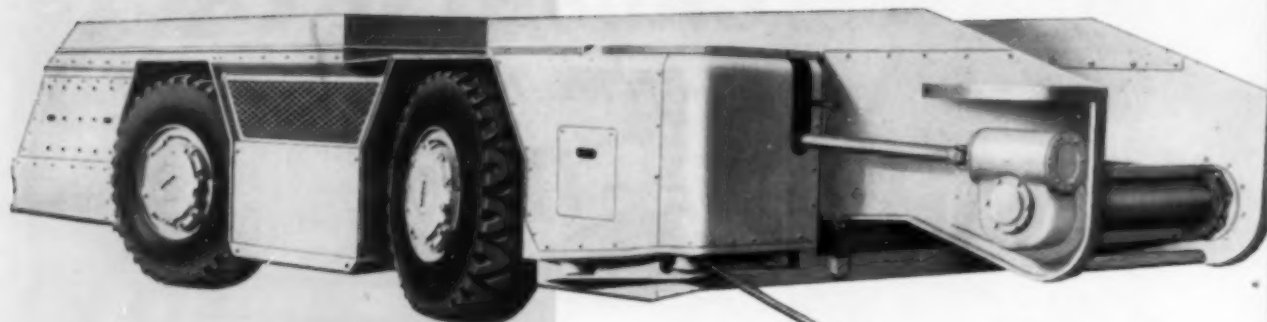
Replacement parts on this American AC-7C Rolling Ring Crusher after crushing 2½ million tons of coal have cost only \$0.0016 per ton (1/6th of a cent).

There's good reason for performance records like this. The American originated rolling shredder ring efficiently splits coal instead of crushing it. Coal spends less time in the crusher; therefore, there is less attrition in the crushing chamber and less wear on the screens. Further, the rings are reversible for double wear. In addition, the effectiveness of the crushing elements permit slower operation speeds.

Our engineers will analyze your reduction problem. No obligation to you.

American  **PULVERIZER COMPANY**
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1119 MACKLIND AVE. ST. LOUIS 10, MO.

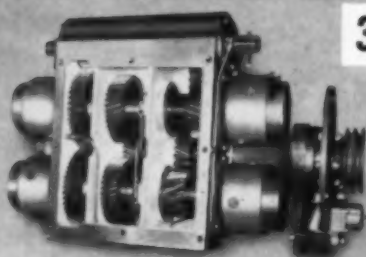
Engineered for Rugged Service and Economy



SINGLE MOTOR AND TORQUE CONVERTER



INTERCHANGEABLE WHEEL UNITS



CONSTANT-MESH TRANSMISSION

the new National Mine **TORKAR**

A.C. or D.C. Shuttle Car

1

A single, large, non-reversing A.C. or D.C. motor amply provides all the power requirements of the new National Mine Torkar and effects substantial savings in motor maintenance. Electrical controls and wiring are at a minimum, further reducing maintenance costs. The motor drives through a torque converter which allows the motor to operate in its most efficient range, prolonging motor life, eliminating the possibility of thermal damage to the motor and conserving current.

2

New type wheel units of heavy automotive design are a feature of the Torkar, and all four are identical and interchangeable. They employ a spiral tooth spur gear-and-pinion drive running in oil. The units are not adversely affected by housing misalignments, and are extremely rugged and durable.

3

Three speeds forward and reverse are provided by the constant-mesh transmission, which permits selection of the gear ratio best suited for the roadbed or grade, eliminates "jogging," and provides dynamic braking. The transmission makes possible the use of a highly efficient non-reversing motor, protects the motor against overloading, reduces wear on the service brake and further reduces power consumption.

For complete details on how the Torkar can reduce your shuttle car costs, consult your National Mine representative or write.

National Mine
Service Company



National Mine Service Company

Koppers Building, Pittsburgh 19, Pennsylvania

All-State Division
Logan, W. Va.
Greensburg Division
Greensburg, Pa.

Anthracite Division
Forty Fort, Pa.
Ky.-Va. Division
Jenkins, Ky.

Ashland Division
Ashland, Ky.
Mountaineer Division
Morgantown, W. Va.

Seneca Division
Beckley, W. Va.
Western Ky. Division
Madisonville, Ky.

Clarkson Division
Nashville, Ill.
Whiteman Division
Indiana, Pa.

*Trademark

U.S. Bureau of Mines

Equipment Approvals

Twenty-four approvals were issued during June and July.

Jeffrey Mfg. Co.—Model ML81 loader; five motors, four 15 hp and one 4 hp, 250 v, DC. Approval 2-1369, June 4.

Goodman Mfg. Co.—Type 424 borer; one motor, 250 hp, 230 v, DC. Approval 2-1370, June 4.

National Mine Service Co.—Type 36 Torkar; one motor, 17½ hp, 440 v, AC. Approval 2-1371A, June 9.

Jeffrey Mfg. Co.—Model MM61 AMC conveyor; one motor, 50 hp, 250 v, DC. Approval 2-1372, June 10.

Goodman Mfg. Co.—Special 425 borer; two motors, one 250 hp and one 10 hp, 230 v, DC. Approval 2-1373, June 10.

Linde Co.—Coal breaking machine; one motor, 10 hp, 230 v, DC. Approval 2-1374, June 10.

Jeffrey Mfg. Co.—Model ML81 loader; five motors, four 15 hp and one 4 hp, 250 v, DC. Approval 2-1375, June 17.

Goodman Mfg. Co.—Type 670-10 shuttle car; three motors, two 20 hp and one 10 hp, 440 v, AC. Approval 2-1376A, June 18.

Goodman Mfg. Co.—Type 670-11 shuttle car; three motors, two 20 hp and one 10 hp, 440 v, AC. Approval 2-1377A, June 18.

Ensign Electric & Mfg. Co.—Type L distribution box; one 800-amp circuit breaker, 220/440 v, AC. Approvals 2-1378 and 2-1378A, June 25.

Joy Mfg. Co.—Type ICM-38H miner; eight motors, four 7½ hp, one 15 hp, two 100 hp and one 30 hp, 440 v, AC. Approval 2-1379A, June 25.

Jeffrey Mfg. Co.—Type MT66 shuttle car; three motors, each 15 hp, 250 v, DC. Approval 2-1380, June 30.

Jeffrey Mfg. Co.—Type MT66 shuttle car; three motors, each 15 hp, 250 v, DC. Approval 2-1381, June 30.

Jeffrey Mfg. Co.—Type 86 Colmol; three motors, each 50 hp, 500 v, DC. Approval 2-1344A, July 2.

Schroeder Bros., Inc.—Roof drill; one motor, 7½ hp, 230 v, DC. Approval 2-1382, July 2.

Goodman Mfg. Co.—Type 300 borer; one motor, 250 hp, 250 v, DC. Approval 2-1383, July 17.

Goodman Mfg. Co.—Type 570-10

shuttle car; three motors, two 20 hp and one 10 hp, 440 v, AC. Approval 2-1384A, July 18.

Ethel Chilton Mines, Inc.—Rebuilt Joy 55C-8E, 55C-8XE shuttle cars; three motors, each 7½ hp, 250 v, DC. Approval 2-1385, July 18.

Salem Tool Co.—Underground coal auger; two motors, each 50 hp, 250 v, DC. Approval 2-1386, July 25.

Jeffrey Mfg. Co.—Type MM76 AM Colmol with remote control; three motors, each 50 hp, 250 v, DC. Approval 2-1387, July 28.

Jeffrey Mfg. Co.—Type MT67

shuttle car; three motors, either two 23 hp and one 25 hp, 440 v, AC, or two 20 hp and one 25 hp, 415 v, AC. Approval 2-1388A, July 28.

Manson Machine Co.—Wet rock dust distributor; one motor, 2 hp, 230 v, DC. Approval 2-1389, July 29.

Acme Machinery Co.—Model HS-HL-4B high seam drilling machine; one motor, 65 hp, 230 v, DC. Approval 2-1390, July 30.

Joy Mfg. Co.—MBCI-IF conveyor; two motors, one 75 hp and one 4 hp, 500 v, DC. Approval 2-1391A, July 30.



BIG PRODUCERS at United Electric

Athey-Cat Coal Haulers steal the show at United Electric Coal Co.'s Buckheart Mine, Canton, Illinois! Ten PH20-DW20s are moving coal 3¼ miles from pit to tipple, handling a big share of the 6000 tons per day.

The PH20-DW20 is designed for *big* production coal hauling. It handles 62 cu. yds. each trip. There's plenty of speed, too—the outfit hits more than 35 MPH. Combine this with a turning diameter of only 38' 4" — fast and trouble-free dumping, and you have the reasons why the PH20 is first choice on big operations.

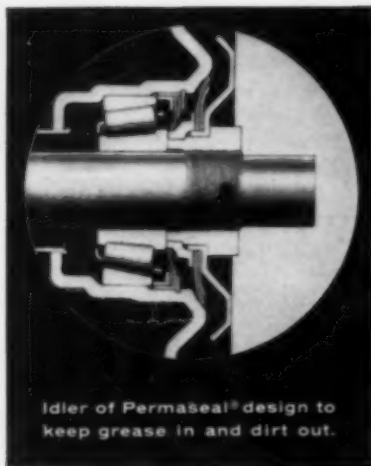
Get the best in coal haulers! Get the PH20-DW20 Team working in your mine. Athey Products Corporation, 5631 West 65th Street, Chicago 38, Ill.

Athey

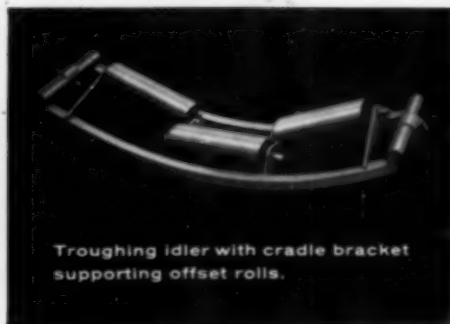
The Complete Trailer Line... **BY THE LEADER**



Troughing idler made up of cradle bracket with catenary rolls.



Idler of Permasseal® design to keep grease in and dirt out.



Troughing idler with cradle bracket supporting offset rolls.

To get extra value—cut operating costs

JEFFREY BELT CONVEYORS

(Wire Rope Type)

have these advantages...

Low first cost—Easy and economical to set up with fewer parts; need no belt training idlers; intermediate sections require no cover plates; two parallel wire ropes replace heavy rigid type angles or channel side frames.

Low operating cost—Fewer components to handle or transport saves time in extending or retracting belt conveyors; means less clean-up time because troughing contour of belt prevents spillage.

Movable and flexible—The lightweight design makes it easy to quickly extend or retract conveyor. Idlers can be moved or changed to suit material or mine condition. It's a simple task to change spacing of troughing idlers and stands carrying return idlers.

Long belt life—Lasts longer as load impact is absorbed by spring effect of wire ropes when load passes over troughing idlers.

Permasseal® idlers—Have Timken tapered roller bearings protected by two flexible diaphragm seals. Inner seal retains lubricant. Outer seal keeps

out dirt. Permasseal idlers prelubricated for years of maintenance-free service.

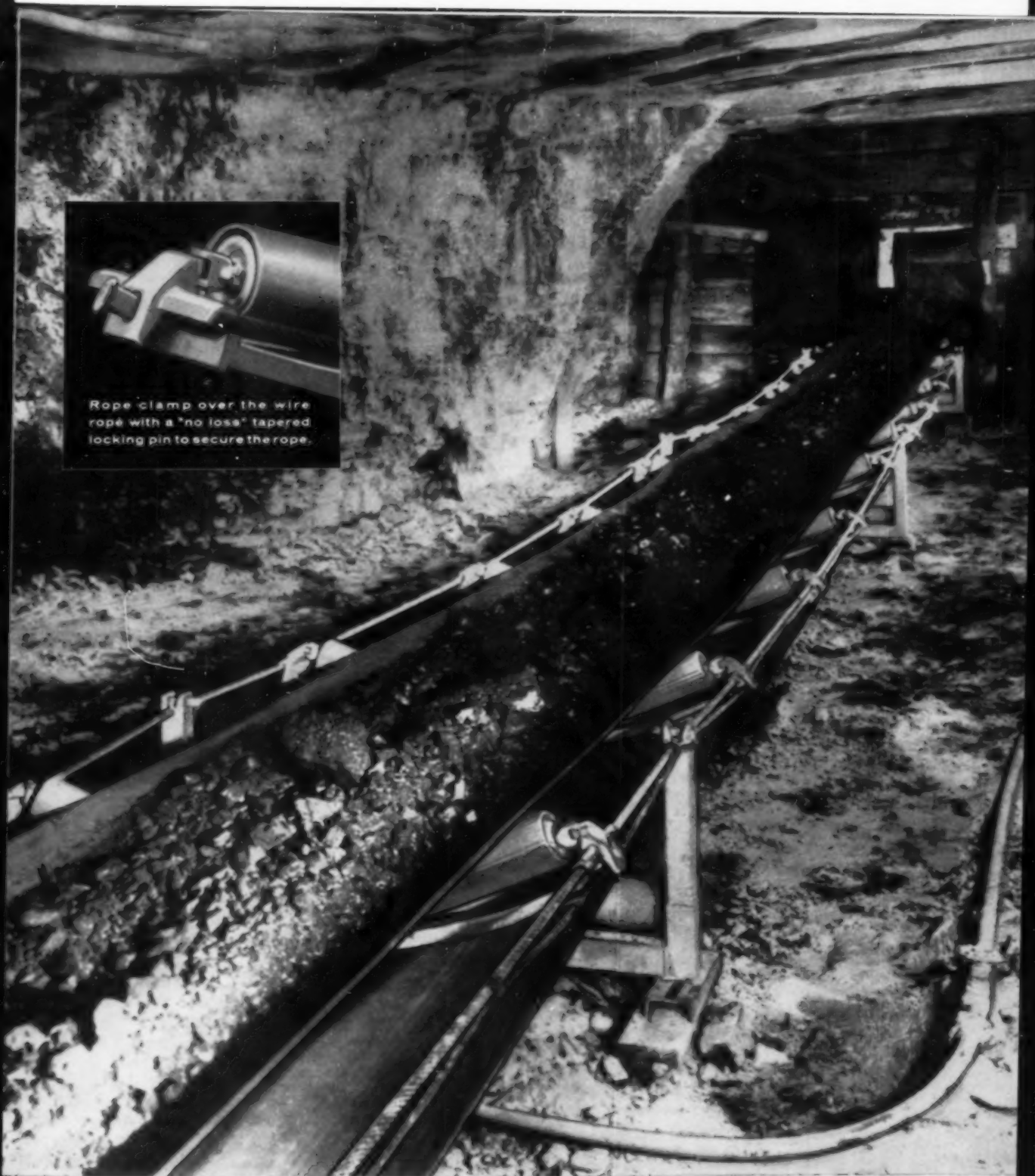
Rope clamp for cradle bracket—Rope clamps with "no loss" tapered locking pins prevent creeping. The two parallel wire ropes are supported and spaced by strong, lightweight stands placed at intervals of approximately 20'. Cradle brackets and support stands hold ropes parallel. No separate spreader required.

Versatility—These conveyors can be used above or below ground to handle coal, salt, gypsum and iron ore. Idler rolls mounted in a cradle may be of the offset type, which permits removing or replacing individual rolls or of the catenary type. The catenary rolls are in line and connected by rivet chain links. This hinged joint arrangement causes the belt to take a troughing contour to suit heavy or light loads. Full width return rolls are used.

Send for bulletin 948 for more details. The Jeffrey Manufacturing Company, 912 North Fourth Street, Columbus 16, Ohio.



Rope clamp over the wire rope with a "no loss" tapered locking pin to secure the rope.



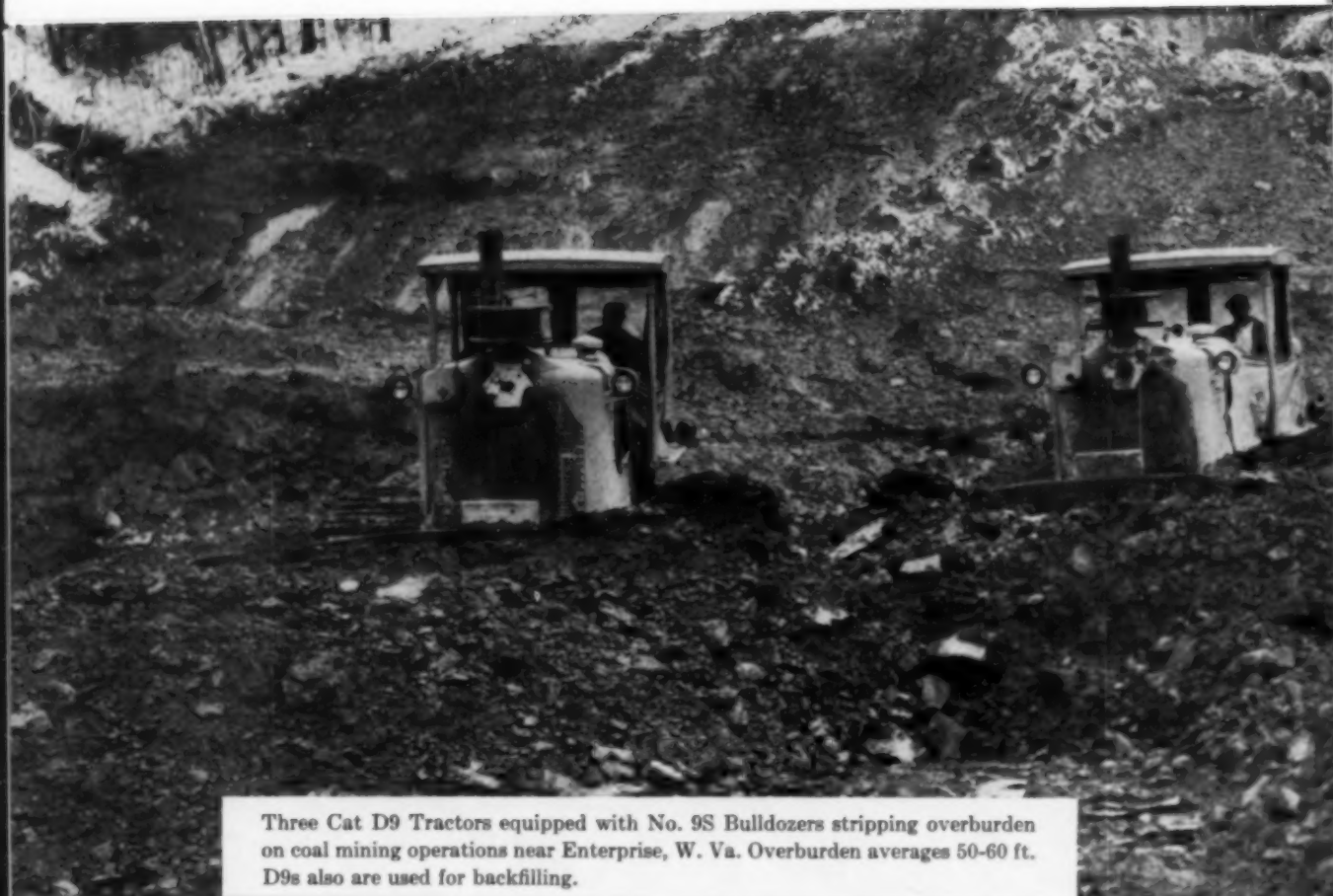
A 150-foot extension can be extended or retracted in less than an hour... no loss of production time with between-shifts extension of Jeffrey belt conveyor.

MINING • CONVEYING • PROCESSING EQUIPMENT...

TRANSMISSION MACHINERY...CONTRACT MANUFACTURING



JEFFREY



Three Cat D9 Tractors equipped with No. 9S Bulldozers stripping overburden on coal mining operations near Enterprise, W. Va. Overburden averages 50-60 ft. D9s also are used for backfilling.

Three D9s stepped up profits in

Profit in a strip mining operation depends on low-cost, high-production earthmoving. That's why you see more and more Caterpillar D9 Tractors at work in successful strip mines. This "King of the Crawlers" is a top producer, day in and day out, even under the most difficult conditions.

Three D9s set the pace for United Coals, Inc., of Enterprise, W. Va., rounding out a 100 per cent Caterpillar team that includes a D8, a No. 977 Traxcavator and three Cat wheel Tractors with Athey wagons.

Lawrence A. Costelac, United's secretary and treasurer, says, "We used to have three different makes of machines. But we went to the exclusive use of Caterpillar equipment because it proved more dependable, more productive and better from a mechanical and service standpoint.

"We purchased three D9s when we realized the tough conditions and tremendous yardage to be moved in our present operation. We're getting the performance we expected—and then some!"

Your Caterpillar Dealer has a complete line of crawlers, ranging up to the mighty D9. Call him today for a demonstration on your job. Just tell him when you want the equipment there.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



this West Virginia mining operation!



Balance, flotation and ease of operation are big features of the D9, says Lawrence A. Costelac, secretary and treasurer of United Coals, Inc. "I like Cat-built Tractors—they just keep on running." On many strip mining operations, a D9 equipped with ripper breaks up the seams of coal.

HERE'S WHY THE D9 IS BEST FOR STRIP MINING

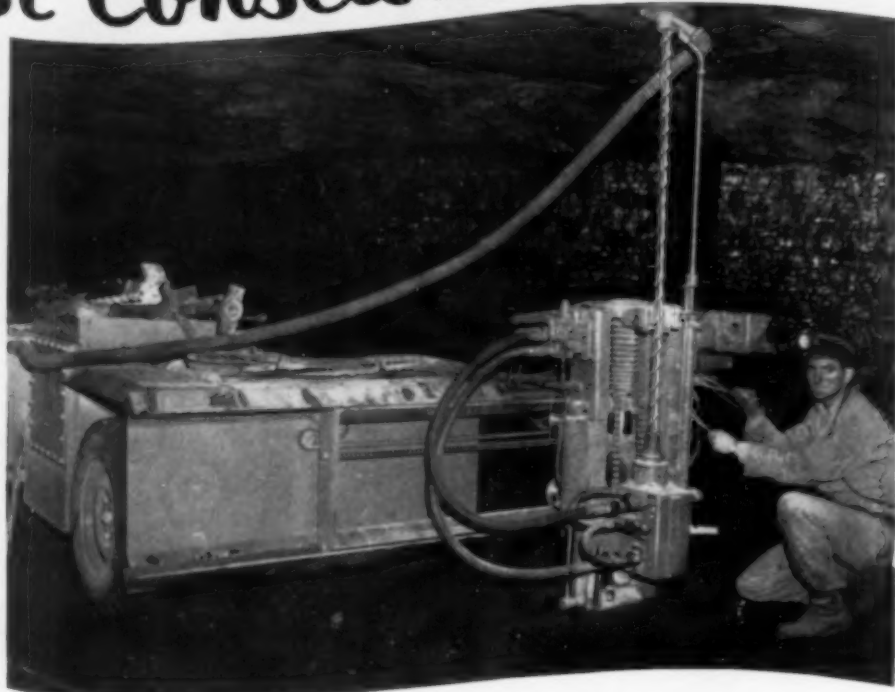
- * 320 HP at flywheel.
- * 30-ton weight.
- * Exclusive Caterpillar oil clutch—plates cooled and lubricated with oil, rarely need adjustment.
- * Optional torque converter transmission.
- * Heavy-duty steering clutches with finger-tip steering. Power-boosted controls.
- * Extra-rugged frame and final drive.
- * Massive 7-roller track frame.
- * Full line of attachments.

CATERPILLAR

Caterpillar, Cat and Tractor are Registered Trademarks of Caterpillar Tractor Co.

**FOR MINING'S
TOUGHEST JOBS**

Cost Conscious? OF COURSE YOU ARE!



FLETCHER Roof Control Drills can give you **MORE BOLTS** per man at **LOWER COST** to you!

WHICH of these problems is keeping your roof control costs too high? HIGH BIT COST? TOUGH MATERIALS? SLOW BIT INSTALLATION RATE?

In mines throughout the country hundreds of high-capacity FLETCHER Roof Control Drills are installing more bolts per man . . . and prolonging bit life as they do it . . . in many cases with a single operator. With their convenient grouping of controls; long, fast strokes in varying seam heights; compact, easily trammed frame and all-hydraulic positioning, these FLETCHER machines will actually deliver two-man results with one-man operation. *Think of the saving!*

There is a mine near you using Fletchers. See them in action. Ask the management about operating costs. Ask the crew what they think. They'll all tell you — FLETCHER Roof Control Drills do the best job — at the lowest cost.

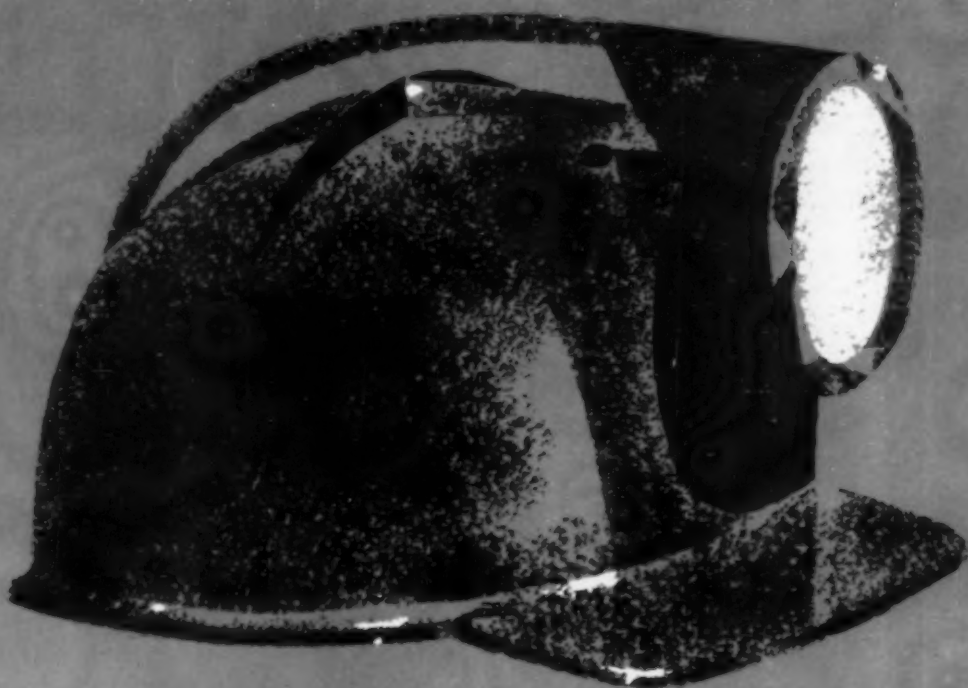
FEATURES

- Jack-feed system delivers maximum smooth thrust with quick raise and return.
- Hydraulic lowering device lets you drill directly from the mine floor.
- Hydra-slide moves your drill across the place smoothly, accurately and fast.
- Compact frame and third-wheel steer makes tramping quick and easy.
- Height range from 28-inches to 14-feet lets you select a drill to exactly fit your mine.
- Telescoping mast gives full stroke in varying seam conditions. And the new floor-to-floor mast gives added safety, speed and power.



J. H. FLETCHER & CO.

P. O. Box 2143, HUNTINGTON 18, WEST VIRGINIA
JACKSON 5-7811



We have coal in our veins

...and have had from the days when our company was known as Coal Operators Casualty Company to the present. Insurance for the mining industry has been our specialty for 24 years, insuring both underground and strip operations.

We have never lost sight of that fact while broadening our facilities to meet the demands of all industries. It's an important reason why we maintain one of the finest engineering departments in the country...skilled and experienced in the practical problems of the mining industry. All engineers joined Old

Republic directly from the coal industry.

Old Republic's engineering staff has increased safety, and decreased accidents for our policyholders—thereby reducing insurance cost. Often, their experienced recommendations result in reduction of other costs of production.

Old Republic writes workmen's compensation and all allied lines—specially adapted to the needs of the coal industry.

For an analysis of your operation or further information, at no obligation, direct your insurance advisor to call, wire or write:

Old Republic

INSURANCE COMPANY

GREENSBURG, PENNSYLVANIA



Knot shown is the dove hitch, made in Plain or Reinforced Primacord and drawn tightly around the Plastic Reinforced Primacord.

Plastic Reinforced Primacord Branch Line, recommended for extremely deep holes — also river crossings and other wet conditions. Covered with a tough plastic material — water-proof and resistant to acids commonly encountered. Tensile strength 275 lbs. 1000-ft. spool weighs 22 lbs.



Don't Worry... use Primacord

Why worry about stray electrical currents when you can hook-up and detonate with Primacord? It acts as the detonating agent throughout the entire column of explosives, or furnishes initiation to primers of blasting agents. This means safer, easier, quicker loading. It connects all holes. This means that you can plan your shots to obtain better fragmentation.

When your blast is loaded and hooked up, it cannot be set off by normal vibration or friction, ordinary impact or sparks, or stray electrical currents. Even a direct hit by lightning failed to detonate it. Primacord must be detonated with fuse and cap or electric blasting cap.

For further information see your explosives supplier or write to

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut • Since 1836

*Primacord® and Detacord® Detonating Fuse, Safety Fuse, Ignitacord®,
Quarrycord®, Pyrotechnical Devices and Blasting Accessories*

Hook-up and detonate with

PRIMACORD®

and guard against *Stray Current* hazards



Reinforced Primacord Trunk Line — also recommended for deep holes where normal strength and resistance to abrasion and cutting are needed. Textile reinforced (yellow with red thread), tough, resilient, flexible. Tensile strength 160 lbs. 1000-ft. spool weighs 19 lbs.

P-9



SEPTEMBER, 1958

IVAN A. GIVEN, EDITOR

For Growth and Profits

"Customer orientation" is one of the latest ways of defining the key approach in sales—the approach that is not aimed at "making a sale" but rather at getting the customer to "make a purchase." The difference is real and can be measured in volume of goods moved and income received in any business. It results from the seller developing the ability to think in terms of the customer's needs and desires, and to act accordingly.

The results of good customer-orientation is a conviction that he gets more satisfaction from that product than from any other, with the further result that he gives the product preference whenever he makes a purchase. On this basis, coal can definitely claim an advance in customer orientation, though it also is quick to note that it still has quite a way to go, even though the competitive hurdles are not as great as a few years ago. But good progress has been made.

Building preference for a product is a combination of many individual ingredients. Cost is one. Quality is another. In both these respects coal's progress has been definite and significant. Thus, as a result of heavy expenditures for equipment, the average value of bituminous coal is today no more than it was ten years ago. This, combined with investments aimed at higher quality, has been a major factor in the improved consumer acceptance now being enjoyed by coal in many markets—the major ones in particular.

Modern production methods—always a primary concern of coal-mining management—thus appear more clearly in their true role, which is assuring the consumer the benefits of maximum quality at minimum cost. The faster and wider these benefits can be expanded in the future, the more the industry will benefit in increased sales and higher net profits. This is the big reason for the emphasis on modernization of mining facilities—long a basic element in the *Coal Age* editorial program and the theme of the October issue, which will be completely devoted to modernization methods, equipment and benefits, and how they have helped specific mining operations attain cost and quality goals.

Coupled with modernization on the selling side, involving market research, advertising, engineering service, and the availability of efficient, economical burning equipment, modernization of mine, preparation and safety facilities means an enhancement of coal's stature in the eyes of the consumer, a growing preference for the product and more and more profitable business in the days of growing demand that stretch ahead. Modernization is a challenge—but a challenge that, properly met, will really pay off. Conclusion: "Modernize now . . . for growth and profits."



HARLAN W. NELSON is a consultant in industrial economics research at Battelle Memorial Institute, specializing in fuel and energy applications. He has been associated with much of Battelle's research on coal gasification, combustion phenomena, fuel utilization studies, and the economics of energy systems, and is the author of numerous publications in these fields. Dr. Nelson is a graduate in chemical engineering from the University of North Dakota, and holds M.S. and Ph.D. degrees from the University of Illinois. Before joining the Battelle staff in 1944, he was associated for 10 yr with the Department of Fuel Technology, Pennsylvania State University. He is a member of several technical societies, and Fellow, the American Association for the Advancement of Science.

Coal Age Atomic Series

WHEN AND HOW FAR will atomic power enter the commercial picture? How will it affect coal? Two previous, staff-written articles have attempted to answer these questions realistically:

"Can the Atom Compete in Making Tomorrow's Power (January, 1956, p 54)?" predicted that rapid growth in coal use for electric power was a near-sure bet for coal until 1975, but cautioned against the pitfalls of complacency and against underestimating the long-range possibilities of nuclear power.

"Planning for Competitive Nuclear Power (June, 1957, p 54)" focused attention on the prospect of competitive nuclear power after 1970 in the upper cost range of 8 to 10 mills per kwhr. Also stressed: participation in overseas atomic development could accelerate the Nation's domestic program.

In this third article of the Coal Age Atomic Series, Dr. Nelson breaks down and analyzes the components of nuclear power costs—the most critical factor in determining the "when" and "how far" of unsubsidized, competitive nuclear power.

—The editors.

Nuclear Power Costs

A specialist in fuel and energy economics gives a depth report on power costs and the nuclear fuel cycle. Among his findings:

- Present estimates for overall nuclear power costs are a little more than guesses. Initial prototype plants, however, are already providing some cost-reduction data.

- Few believe that the U. S. will need nuclear power in the next 10 to 20 yr; most agree it will be welcomed before the end of the century.

- Commercial nuclear plants will find their first uses in regions of highest fuel cost; for example, in Europe and other overseas areas.

- Since fuel makes up only about 15% of the delivered cost of electric power, consumers served by nuclear plants are not likely to gain lower monthly bills.

- Nuclear power by fusion is generally agreed to be far in the future.

By **Dr. Harlan W. Nelson**
Consultant, Department of Economics
Battelle Memorial Institute

TO ALL INTERESTED in analyzing the competitive challenge of nuclear power, the graph on the page facing this one underscores the first inescapable fact: the cost of conventional electric energy is unique among commodities and services in resisting the trend of rising costs. This fact reflects an ample supply of fuels, a growing economy that has permitted the use of increasing numbers of large, efficient power stations; ample capital to generate and take advantage of technical improvements; and a growing population.

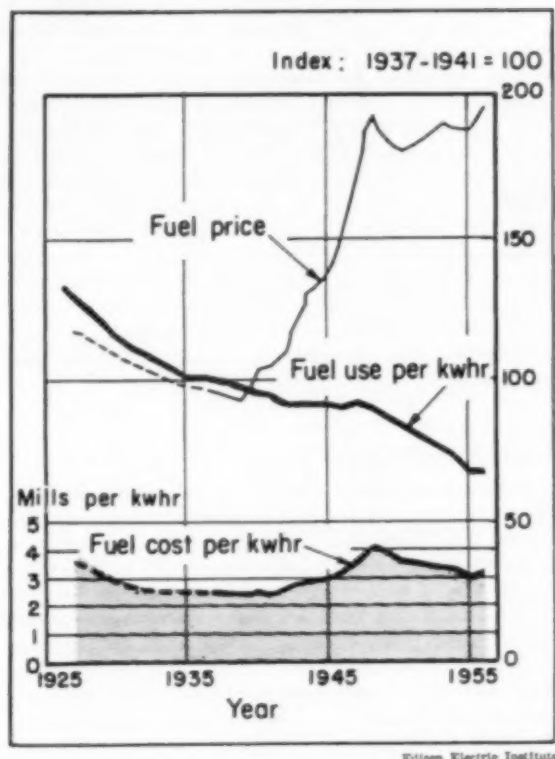
Along with the graph's story of a unique cost record, analysts should also take into account the following commonly-accepted future trends of the electric power industry:

1. From the turn of the century to the present time, the production of electric energy has roughly doubled every 10 yr. Growth of this order is expected to continue for the next two decades, although the numbers involved are becoming so large that past rates of growth cannot be expected to continue indefinitely.

2. Hydroelectric facilities have growth possibilities but most of the future capacity additions will be represented by steam stations.

3. Ample supplies of coal are available to provide fuel

Today and Tomorrow



for electric power growth expected in the foreseeable future, even if lower proportions of oil and natural gas are used. Coal prices are expected to increase more slowly in the future than are those of oil and gas.

Notable also are these facts: the cost of electric energy at the station bus bar currently averages about 7 mills per kwhr; of this total, production costs average about 3.3 mills, of which 60 to 80% represents the direct cost of the fuel. However, by the time the electric energy reaches the consumer, fuel costs represent only about 15% of the total delivered price.

In view of the facts and trends cited above, what then is the place of nuclear power in the United States in the future? An assured answer to this question is difficult, but it revolves around considerations of timing, international obligations, geography and logistics, and technical development.

The factor of time has lead to some confusion and misunderstanding. The misunderstanding has resulted from the distinction that must be made between power requirements of the immediate future, say the next 10 to 20 yr, and the longer-range future. There are few who believe that this country will need nuclear power in the immediate future, but most are agreed that we will need and welcome nuclear power before the end of this century. The factors of geography and logistics will play an important part in the applications of nuclear power. Commercial nuclear power plants will find their

CHALLENGE TO THE ATOM: Increased efficiency in conventional fuel use has minimized fuel cost per kwhr in last 30 yr. Low-cost coal will strengthen future cost position.

first uses in regions of highest fuel cost. Since in terms of average cost of electric power to the consumer fuel represents only about 15%, it is unlikely that nuclear plants will result in lower monthly bills.

Few countries are in the fortunate position of the United States in regard to fuel reserves. In Europe and elsewhere, nuclear-derived power will be needed much earlier than here to enable the production of enough power to satisfy the rising demand. Also, fuel costs in these countries are higher; the stage where nuclear power becomes economic will be reached sooner. Great Britain expects to reach the break-even point on power costs from nuclear plants as compared to coal by 1962. Thereafter costs are expected to fall below those for conventional plants.

Most scientists, statesmen and representatives of industry believe that the United States is under an obligation to maintain a substantial rate of effort in the research and development of nuclear power even though economic applications in this country are not as urgent as in foreign countries. The principal point of difference in opinion is how to carry out a technical program that will prove to be of greatest over-all benefit to this country as well as our friends in the free world. Certainly if we do not contribute substantially to such progress, we will lose something in international good will as well as an opportunity for our industries to share in the world market for nuclear plants, equipment and materials.

Total Nuclear Costs: Fuel And Other Items Related

The cost of nuclear power is a function of capital charges, fuel costs, and operating expenses. In the present discussion we are interested primarily in the economics of the fuel cycle, with, however, full appreciation that the basic features of design, safety features, and material properties are factors greatly influencing the cycle. The nuclear properties of the materials involved in the system together with their chemical and physical properties furnish the basis for the design of a system. The geometry and structural reality of the reactor system then becomes an engineering problem of evolution and development, with the economics of the system becoming apparent with progress and experience.

A summary of carefully estimated power costs for the pressurized water (PWR) and Calder Hall type reactors is presented in the table on the following page. These are the most practical reactors developed thus far. The figures are from a study by the American Radiator and Standard Sanitary Corp., which considers the economics on the basis of second generation reactor systems. The relationship between fuel costs for the two types and capital charges for this country and Britain are evident.

U.S. vs Britain: Power Costs from Calder Hall and PWR Reactor Types, 90,000 Kw

	Mills per Kilowatt Hour			
	Calder Hall		PWR	
	In Britain	In U.S.	In Britain]	In U.S.
Fuel costs				
Fuel rental.....	0.5	0.4	0.2	0.2
Fuel fabrication and re- processing.....	1.6	1.6	7.5	7.5
U-235 burnup cost.....	1.4	1.4	2.0	2.0
Plutonium credit.....	(-1.4)	(-1.4)	(-0.5)	(-0.5)
Net.....	2.1	2.0	9.2	9.2
Capital charges.....	4.9	14.4	3.2	9.4
Site operating costs.....	1.0	1.5	0.7	1.0
Total.....	8.0	17.9	13.1	19.6

For either nuclear power plant, capital costs are of obvious importance. The matter of location of the plant exerts a strong influence on over-all costs, as shown by a comparison of the capital charges for building the same type of reactor plant in the two countries. Fuel costs in this comparison are greatly affected by the choice of reactor.

Fuel Cycle: Conventional vs Nuclear

The fuel cycle for the conventional steam power plant is concerned with all phases of the steam-raising process involving the fuel and its waste products. It begins with the production of the fuel at the mine or well, then its preparation (or refining), transportation, storage, preparation for feeding to the furnace, and, finally, its combustion in the furnace and disposal of waste products. Although simply stated, much hard work and ingenuity have been and are being spent in improving the equipment and procedures involved in each of the steps of the full cycle. The end result, as shown in the graph on p 71 has been remarkably successful.

Before going on to consider the fuel cycle for a nuclear power plant, it will be of interest to consider some basic differences between the release of energy in a conventional combustion system and in one involving nuclear fission. When coal is burned, the atoms of carbon react with the oxygen in the air to form a new compound, carbon dioxide. This reaction is accompanied by the release of heat energy. The atoms involved are not basically changed; the carbon atom in the carbon dioxide of the flue gas is the same atom that was originally present in the coal. The energy released is chemical energy, involving only the electron system of the atom.

In a typical process of nuclear fission, an atom of uranium-235 is struck by a neutron with the result that the atom is split into two fragments and several free neutrons. The uranium has been changed into entirely different atoms. However, the total mass of the new fragments and neutrons produced is slightly less than the mass of the original uranium atom. The difference in mass corresponds to a release of energy, which appears first as kinetic energy of the fragments and finally as heat energy as the products collide with atoms in surrounding material and are slowed down.

If other atoms of uranium-235 surround the first atom undergoing fission, some of the new neutrons produced

can produce other fission reactions, and a self-sustaining reaction becomes possible. If of critical size and uncontrolled, the fission chain reaction can build up extremely rapidly with the explosive force of an atomic bomb. If controlled, the rate of fissioning can be regulated to release useful heat energy as in a power reactor.

This outline of the basic differences in the reactions involved in the two fuel cycles leads to a further difference that is of extreme significance in the development of nuclear power reactors. The difference is related to the radioactive properties of the products involved in the fission process. Because of the biological effects of the radiation, expensive and elaborate means of shield protection are required for operating personnel at the reactor site and during all stages of handling the spent fuel, reprocessing and waste disposal. This results in higher costs for containment, shielding, protection, insurance, and disposal that are reflected in both capital and operating costs.

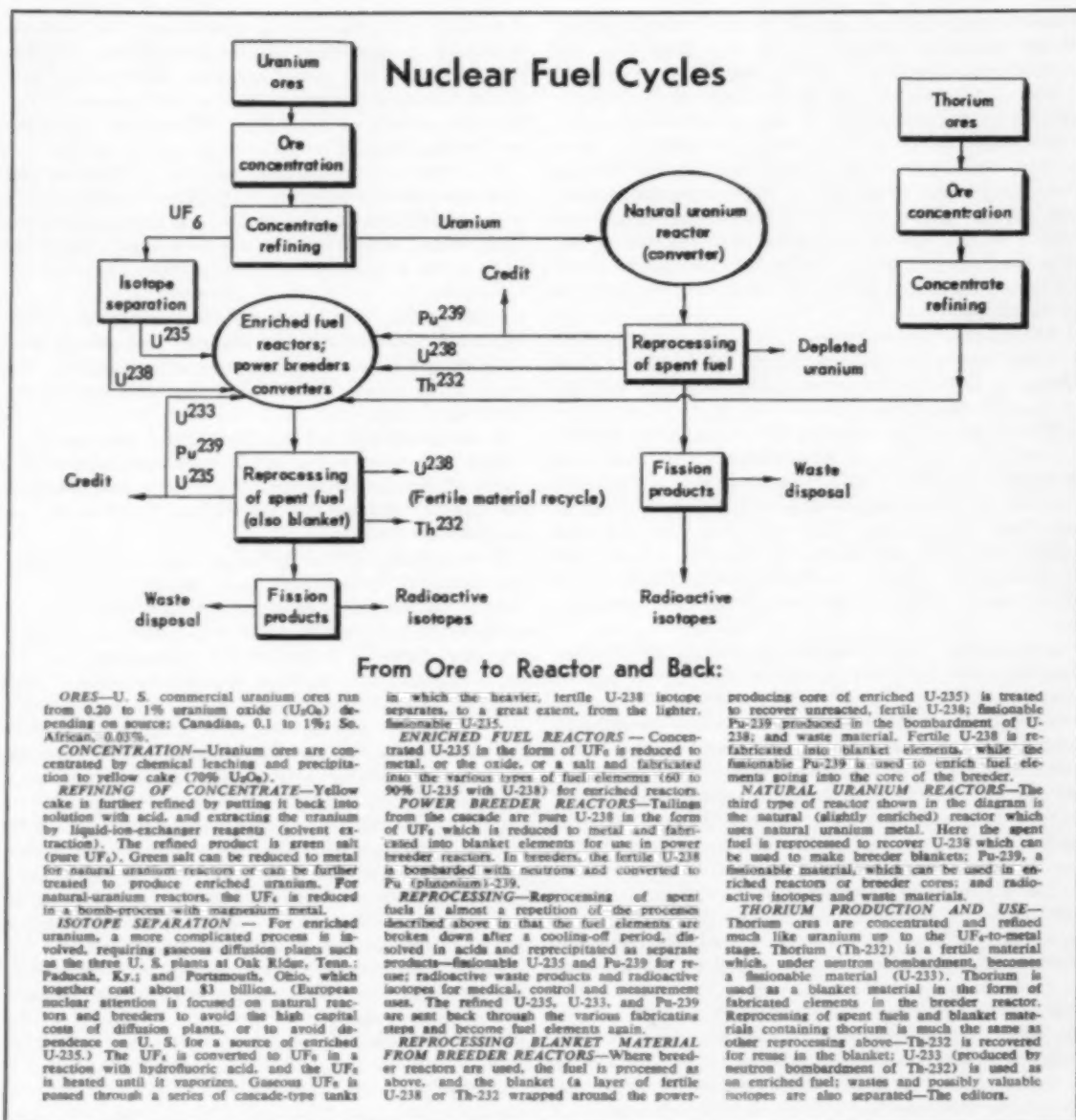
Nuclear Fuel Cycles

Economics a Ruling Factor — From consideration of the variable factors involved in possible combinations of fertile and fissionable materials, moderators, coolants, levels of neutron energy and geometry for nuclear reactor systems, a wide choice of reactor types may appear to be possible. Actually, of the possible permutations, many can be removed from consideration on the basis of nuclear physics, and still others on practical engineering bases or materials incompatibility. There remain a number of designs of reasonable technical feasibility. Research and development work in progress and scheduled for the immediate future is designed to pin down the efficiency and practicality of those systems. After a certain stage in this work, economics becomes a ruling consideration, since energy produced by nuclear means for civilian purposes must compete successfully with that derived from conventional sources.

Elements in the Cycle — The accompanying diagram shows the principal elements of the fuel cycle for typical power reactors. The flow of materials, reprocessing steps and possible recycling steps are indicated. On an overall basis, the successive steps considered in the cycle include:

1. Mining, concentration, and refining of uranium (U) and thorium (Th) ores.
2. Preparation of uranium and thorium of required properties.
3. Isotopic separation of U-235 and U-238 for systems using enriched fuels.
4. For heterogeneous reactors, the production of suitable structural and cladding materials for fuel elements.
5. Preparation, fabrication, and assembly of reactor fuels.
6. Burning the fuel in a reactor.
7. Reprocessing of spent fuels for removal of fission products and recovery of the fissionable materials U-235, U-233, and Pu (plutonium)-239, and the fertile materials U-238 and Th-232.
8. Processing of the radioactive waste materials; recovery of radioactive isotopes.
9. Waste disposal.

Needless to say, the technical feasibility and practical-



ity of any nuclear reactor system must first be demonstrated. In addition, it is highly desirable at an early stage to make estimates of the economics of the system. These early approximations will serve to indicate the areas in which the system is deficient, the important interrelated factors, and the component areas subject to technical and economic improvement. In the final analysis, of course, the economics of a system can be put on a firm basis only when progress has been made to the point at which operating data on commercial-sized plants are available, including all items of the fuel cycle. We have not yet reached this stage of development and reliably firm cost figures are yet to be obtained.

Cost Components—The principal items commonly figured in nuclear fuel cycle costs include:

1. Fuel charges
2. Fuel processing
3. Inventory charges
4. Fabrication costs
5. Reprocessing costs
6. Credits for plutonium and depleted uranium
7. Waste disposal

When cost estimates are presented, the above items are sometimes shown in combined form. The inventory cost is related to the reactor design and operating schedule, and may be considered as fixed capital charge on the fuel cycle. Other variables affecting fuel cycle costs are involved in the method of operating the reactor. As shown in the accompanying diagram, operations may involve (1) recycling of both uranium and plutonium, (2) recycling one and selling the other, (3) operating

without recycle and selling the uranium and plutonium, or (4) operating without recycle and discarding the materials discharged from the reactor.

The calculations involved in working out the characteristics of the elements of a fuel cycle are commonly expressed as dollars per unit weight of fuel. The items may be changed to a basis of mills per kw-hr by dividing the costs per unit weight for fuel processing, fabrication, etc., by the electrical output in kw-hr obtained per unit weight of fuel. The output figure is a function of the exposure level of the fuel (megawatt days per ton) and the plant efficiency percentage in converting heat to electrical power.

The cost of the fuel actually burned in the reactor is based on the schedule of charges set by the Atomic Energy Commission for natural uranium or fuel enriched to the required degree.

The enriched fuel supplied by the AEC is initially in the form of uranium hexafluoride (UF_6). The cost of transforming the fluoride to the oxide or metal actually used in the fuel elements is in addition to the official scheduled charges and must be borne by the user whether the processing is done by the AEC or by a commercial facility. This is a small but significant item which may amount to several per cent of the total fuel cycle costs.

Inventory — The Government retains title for enriched uranium, and such fuel is only rented to the reactor operators at an interest rate of 4% per year of the total value assessed by the AEC. Interest charges are in effect until the fuel material has gone through the separation plant and until the depleted uranium to be credited to the user has been converted to UF_6 . The account of the user is then credited for the depleted material and for plutonium and is charged for the fuel burnup and losses that have occurred.

Direct purchase of enriched material may not be possible anywhere for sometime in the future. However, when and if fissionable materials can be purchased outright on the open market, the purchaser will have to pay interest charges on the capital required to purchase the fuel. In case of purchase, the usual interest charges on borrowed capital will prevail, and charges now being assessed by the Government as rental will be raised by a factor of two or three. When this occurs, there will be greater incentive than ever to prove out on a practical basis those reactor designs which show low-core inventories and low-retention times for fabrication and reprocessing. In comparing the over-all economics of different reactor systems, the bases of charges for inventory must be similar.

Inventory charges are derived by dividing the capital invested in the inventory times the annual charges in per cent by the product of the full-capacity output, the plant load factor, and the number of hours operated per year. For non-amortized property, such as for capital tied up in fuel inventory, the annual charges would be of the order of 12%. Included would be capital charges of about 9-10%, taxes of 2%, and insurance charges of 0.2%, or a total of about 12%.

Fuel Fabrication — For heterogeneous power reactors fuel fabrication is an important cost item in the fuel cycle. Although costs remain high, considerable progress has been made in areas involving design, preparation

of materials, and fabricating procedures. The response by industry to invitations to participate in this field has been prompt. Three years ago there were only a few private organizations active in this field. More than a dozen firms are now engaged in this work and have the required facilities.

The chief factors affecting the costs of fuel element fabrication were outlined by T. T. Magel and B. S. Olds at the 1956 Conference of the Atomic Industrial Forum. Their outline serves well to indicate the principal items contributing to the over-all costs of this portion of the fuel cycle. The items are as follows:

1. Research, development, and prototype costs. Improved elements must be designed and tested, even while accepted fuel elements are in a limited production phase. Such research costs must be paid out in the production phase.

2. Accountability and handling. These costs represent several percentage points of the total costs of fuel elements. They may be decreased with improved planning, but may be increased if plutonium and U-233 must also be accounted for.

3. Preparation of the fuel alloy. Factors of criticality and reactivity involve high costs in this stage of fuel element manufacture. Analyses and tests occasioned by stringent chemical, corrosion, and metallurgical specifications are numerous and expensive. Experience in material preparation and improved specification materials will result in lowered costs.

4. Fabrication. There are two principal aspects of this stage of production. For essentially "cold" natural uranium or U-235 in metal or alloyed form, costs for a given design will drop as production volumes are increased. If recycled fuel containing plutonium, U-233, or fission products is to be used, special safe-handling or remote fabrication will be required, and another and largely unknown cost will be involved. The net cost to the complete reactor process will be based on a balance of the cost advantage of recycling fuel against the disadvantage in costs of remote handling and fabrication. Also of importance is the design of the fuel element, which involves the cost of materials involved and the degree of precision required in machining and other mechanical operations.

5. Cladding. This operation is usually necessary to prevent corrosion and to contain fission products. Low neutron-absorption materials are required, and many of these are in the category of the less familiar metals. However, the cost of zirconium and similar metals may be expected to decrease as production schedules are increased. Recovery from spent elements is not yet practicable; hence, the full cost is on the debit side. Optimizing the procedure for applying the cladding will also lower costs.

6. Proving cladding integrity. Any failures of the cladding within the reactor will be costly, so integrity must be demonstrated beforehand beyond reasonable doubt. The development of foolproof claddings will minimize costs of improving integrity, but design changes and requirements of improved performance and higher operating temperatures will continue to present problems. Proving integrity of elements from recycled "hot" materials will require the development of new methods.

7. Assembly. Costs of assembly for "cold" elements

will continue to decrease as production volumes are attained and optimum joining procedures are applied. If remote assembly is required, costs will be higher.

8. Yield. For expensive fissionable materials, it is essential to have high yields. Improvements will be achieved in this area as developments in the procedures discussed above are achieved.

9. Size of production lots. Because of criticality factors, small production lots will continue to limit gains to be achieved by increasing the volume production. However, as facilities are scheduled for repetitive runs, costs will decrease.

10. Interest on fuel inventory. With improved and faster production schedules and higher yields, inventory costs will approach a minimum.

It is difficult to attempt to assign a cost valuation to the fuel fabrication portion of the fuel cycle. Some costs have been published, but details regarding bases for calculation are usually not given, and often the fabrication costs and reprocessing costs are lumped together. Most of the figures published are estimates, and, more often than not, are based on the more optimistic figures to be achieved with an assumed fixed element design and production volume. This tendency is reasonable, of course, since costs for any new development, process or machine, cannot be fairly expressed by prototype costs but must be predicted on a volume production basis.

In the table p 72, the combined estimated costs of fabrication and processing were shown to be 7.5 mills per kw-hr for a PWR-type reactor built in this country, based on second generation technology. This is based on an exposure level of 6,000 megawatt days (mwd) per ton of U. If this level were to be increased to 10,000 mwd per ton, the combined fabrication processing costs would be reduced to 5.6 mills per kw-hr. This represents the effect of longer periods of power output between processing periods.

A factor of importance in costs of fuel elements of the PWR-type is the zirconium employed as cladding and structural material for both seed and blanket assemblies. Lower costs in this area will be possible when the costs of either zirconium sponge or of fabricated products, or of both, are reduced. The recent contracts for sponge at a price of about \$6 per lb probably set the price level for several years. Increased industrial demand will serve to stimulate further price reductions, but improved processes of production, handling, and quality control will also be necessary. Improvements will be made in the yield of zirconium products from sponge, and improved fabrication techniques more nearly in line with other structural materials will be a factor in reducing over-all fuel-element fabrication costs. Authors of the American Standard Study estimate that with a substantial improvement in zirconium fabrication costs and expected reduction in zirconium raw materials costs, materials costs could be reduced to about 1.8 mills per kw-hr at an exposure level of 10,000 mwd per ton. Modifications in fuel element design could reduce manufacturing costs of fuel elements to a level of about 0.7 mills per kw-hr. The authors of the study conclude that a total materials and fabrication cost of about 2.5 mills per kw-hr is the minimum cost for the foreseeable future based on current design for a PWR-type fuel element.

Reprocessing — Under the present status of development, the operation of a reactor must be interrupted after only a small number of the desired nuclear reactions have occurred. Consequently, to achieve full utilization of the fissionable or fertile materials, several cycles of the power-producing operations must be alternated with intervening steps of processing, recovery, purification and waste elimination before a reasonably complete utilization of the fuel materials can be obtained. Such reprocessing is necessary for several reasons: (1) to rework the fuel elements in which structural and heat transfer properties have deteriorated during burnup, (2) to add makeup fissionable material, (3) to remove poisons and waste products, and (4) to recover fissionable fuel bred in the reactor.

The complexity of the process and resulting costs are related to the type of fuel, the alloying materials, the kind of cladding, and the geometry of the reactor. The process selected must furnish high yields, since the materials involved are expensive. The over-all reprocessing operation must be accomplished as rapidly as possible so as to keep to a minimum the retention time and thus the inventory charges associated with the use of high-value materials. Losses must be kept low, particularly if a number of cycles are required to obtain an economic degree of fuel utilization.

The combined factors relating to fuel reprocessing result in a costly cycle. Operation of a plant for processing radioactive materials is expensive. Some time ago, the AEC estimated the difference in costs between a plant processing a radioactive material and one which performed the same service but with ordinary materials. These estimates concluded that construction costs for the radioactive plant would be 12 times that of the comparable nonreactive plant, and that operating costs would be almost three times as much.

At present, the solvent extraction method of reprocessing is being used. Other possible methods under investigation include chemical separation by precipitation, ion exchange, distillation based on volatility, and pyrometallurgical processes.

The costs of reprocessing are closely related to the daily or yearly volume of the fuel materials involved. Although high costs of containing and transporting radioactive waste materials would appear to favor processing at or near the reactor site, it is possible that economic processing can be achieved only on a larger scale. The reprocessing plant would thus perform a service function for a number of reactors in a given area.

Reprocessing of spent fuel has not yet been accepted as a business venture by private industry, although some work is being done on the development of a packaged reprocessing plant for an individual reactor site. Until the volume of reprocessing activity reaches a level sufficient to attract participation by industry, the AEC has announced its willingness to perform this service. Last year, the AEC announced a charge of \$15,300 per day for use of its reprocessing facilities. Basis for the charge is an assumed plant with a capital investment of \$20,570,000, having a capacity of 1 tpd of natural or slightly enriched uranium. The charges assume a yearly capacity of 300 tons and include waste disposal but not transportation.

Credits for Plutonium and Depleted Uranium—For en-

riched systems of low or moderate burnup, the unburned U-235 is credited after the spent fuel is reprocessed. For natural uranium systems, the credit may or may not be applied. Plutonium or bred U-233 would also be credited to the fuel cycle charges. As a final objective, the breeder reactor would furnish the ultimate in credit, with the net cost of fuel consumed approaching zero.

The unit value of plutonium bred in a reactor is currently established by the government. The value of \$12 per gram has recently been raised to \$30 per gram for a specified schedule of years. Ultimately, the price of plutonium will be based on its value as a fuel, which probably will be lower than the presently assigned value.

Waste Disposal—The disposal of fission wastes is a factor of great physiological and sociological significance in connection with a nuclear power program. It is also a significant factor in the economics of the fuel cycle.

H. R. Zeitlin and his coworkers have recently discussed the economics of waste disposal. They believe that waste disposal costs should be held to a figure of about 1% of the over-all costs of electricity from a power reactor. If this would be a reactor producing power at the bus bar at a cost of 8 mills per kwhr, waste disposal costs should be less than 0.1 mill. They consider costs of storage, cooling, shielding for shipment, and transportation, and show some of the relationships of these costs with the degree of activity of the wastes. In studies in Canada, the cost of waste disposal was found to be equivalent to 0.12 mills per kwhr for a plant capacity of 200 mw and 0.06 mills per kwhr for a total capacity of 1,000 mw. Factors affecting the cost of waste disposal include the type of fuel element and cladding, method of processing, and the degree of enrichment and burnup.

The costs of waste disposal are included under the schedule of prices for reprocessing by the AEC.

Nuclear Power: Overall-Costs

As an example of calculated costs of power producing reactors, the comparative data in the table following are presented. These cost figures were prepared in connection with the report of the "Euratom" study committee. The comparisons cited are used because they concern reactors which to date have reached the highest state of development. Comparable economic bases were used for all three reactors. Many other cost calculations are available for other types of reactors, but since the purpose of this discussion is general, no attempt will be made to cover the field of reactor design factors. Actual values for interest charges and construction costs—considered average for the countries involved, and are not typical for this country.

Note that the net fuel costs vary by a factor of almost 100% for the boiling water reactor and the Calder Hall unit. Note also that the over-all energy costs for the three reactor systems do not vary by more than 8%—much less than the 25% contingency factor. As is often the case, the plant with low fuel costs is counterbalanced by higher capital charges. One of the problems is to prove out a reactor design that not only is economical on fuel costs, such as a breeder might be, but also shows conservative capital costs for equipment, buildings, and inventory.

Euratom Power Cost Estimates

	Mills per Kilowatt Hour		
	PWR	BWR	Calder Hall Type
Fuel costs:			
Uranium in fresh fuel...	5.8	2.1	2.0
Fuel fabrication.....	1.1	1.7	0.4
Chemical reprocessing...	0.4	0.3	0.3
Plutonium credit.....	-0.9	-0.8	-1.0
Uranium credit.....	-3.7	(-0.3)	(-0.3)
Net fuel cost.....	2.7 (24%)	3.3 (31%)	1.7 (16%)
Other operating costs....	1.0 (9%)	1.0 (10%)	1.0 (9%)
Fuel inventory charges....	1.3 (11%)	0.8 (8%)	0.7 (7%)
Capital charges.....	6.3 (56%)	5.4 (51%)	7.4 (68%)
Total cost of electricity	11.3	10.5	10.8
Total plus 25% contingency.....	14.1	13.1	13.6
Cost range.....	11.3-14.1	10.5-13.1	10.8-13.6

The many published accounts of nuclear power costs have shown such wide variations that confusion has resulted. The varied assumptions made regarding capitalization, load factors, and fuel cycle charges, and the lack of knowledge of many costs and charges that can come only from experience with working plants are responsible for much of the confusion. In a paper presented this year before the Atomic Energy Management Conference, L. H. Roddis Jr., then deputy director of the AEC Division of Reactor Development, showed how widely divergent cost estimates can be even for a specific type of reactor. The optimist, Roddis showed, may present evidence that total power costs are only 2 mills per kwhr, the pessimist, 31.6 mills per kwhr. Although somewhat exaggerated, the aggregate differences resulted from the additive results of a series of assumptions regarding capital charges, plant factor, site and construction charges, and many of the fuel cycle costs. The conclusion of Roddis in which he was joined by others, was that cost estimates made at the present time are little more than guesses, since our experience to date has been far too limited.

In spite of the confusing aspects of reported nuclear power costs, real progress is being made. Plants in operation such as the PWR at Shippingport, the experimental boiling water reactor at Argonne, and the boiling water reactor at Vallecitos, California, will furnish practical information that will result in technical and economic progress. For example, the Argonne experimental boiling water reactor was designed for an output of 20,000 thermal kw. Subsequent operating experience showed that the power output could be boosted to 62,000 thermal kw without any changes in reactor design. This resulted in decreasing the capital and operating charges to about one-third of the initial value and total power costs at the bus bar of the experimental plant from 52 mills per kwhr to 32 mills per kwhr, a spectacular decrease. Direct fuel costs, of course, were unaffected. But there is a good chance for a decrease to be achieved if a larger plant (240 thermal kw) were built with higher burnup of fuel obtained by a small increase in fuel enrichment and by lower fuel-fabrication costs brought about by the fourfold increase in volume.

Somewhat similar results have been obtained with General Electric's Vallecitos reactor, a prototype system

for the full-scale Dresden plant now under construction. Its operators believe it is possible to increase the power output from 30,000 thermal kw to 100,000 thermal kw with only minor modifications.

In summary, to reach an economic level for producing nuclear power, the following seven factors must be optimized:

1. Cost of fuel. Achieved by improved mining, refining, and processing procedures.
2. Burnup in the reactor. If the burnup is increased, processing and fabricating costs can be decreased in nearly direct proportion.
3. Breeding rate. Better utilization will decrease fuel costs.
4. Improved fuel composition and better fabrication methods.
5. Improved processing techniques.
6. Improved and more economical means of waste disposal.
7. Better utilization of possible credits from useful fission products.

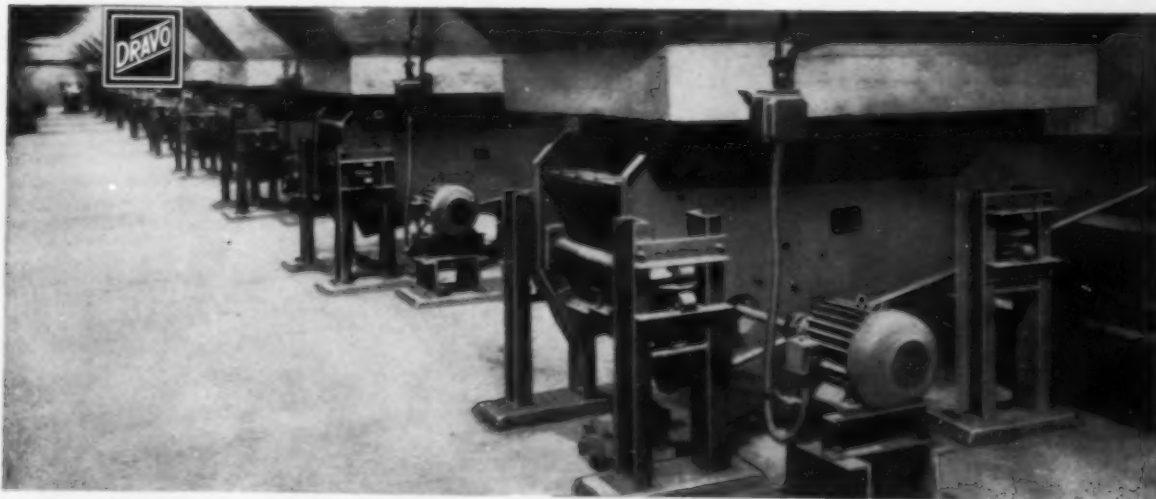
Perhaps more than anything else, the economics of the fuel cycle is concerned with optimizing the selection and application of materials. Nuclear characteristics of materials are fixed properties. With these factors as a starting point, selection must be made on such bases as corrosion resistance, radiation damage, temperature behavior, availability and cost. What appears good to the designer might be gall to the economist and the pro-

cessor. Compromises will be the rule until the optimum possibilities are proven in practice.

Nuclear Power by Fusion

The possibilities of obtaining power by the fusion process are receiving increasing attention. In this process, energy is released when two hydrogen atoms are caused to combine and form a third and heavier atom. This is the process responsible for the energy produced by the sun and what happens during the explosion of an H-bomb. One problem is to produce and contain the extremely high temperatures required to produce the fusion reaction. Millions of degrees of heat are necessary. This heat is available in the sun, and a small atom bomb furnishes the heat to trigger the fusion reaction in the H-bomb. The big problem in developing a fusion power generator is to produce, maintain, and control this heat and it is, indeed, a formidable one.

The incentive here is that the heavy hydrogen used in the fusion reaction is potentially available in large quantities in the waters of the seas and oceans—enough to satisfy the power needs of the world for centuries. The story of fusion, its problems, possibilities, ultimate rewards, and, again, international political implications, is an interesting one. However, the problems appear to be so enormous, even if they are ultimately solved, that practical realization is generally agreed to be far in the future.



Low maintenance, economical operation with DRAVO-SCHENCK vibrating screens, conveyors, feeders

Low maintenance is the keynote of Dravo-Schenck equipment. In typical installations like the row of feeders shown here, repair and replacement is held to a minimum.

The reason for such economical operation is found in the precision design of the unique "Micro-Thrust" exciter unit which reduces wear by moving material with minimum contact with troughs or screens, and the rugged construction of all wearing parts.

These heavy duty screens, conveyors and feeders are at work in a wide variety of applications—handling ferrous

and non-ferrous ores, sinter, chemicals, cement clinker, crushed stone, coal and other abrasive or hard-to-handle materials.

Our engineers will gladly work with you on specific problems or write for Bulletin No. 1475, Dravo Corporation, Pittsburgh 22, Penna.

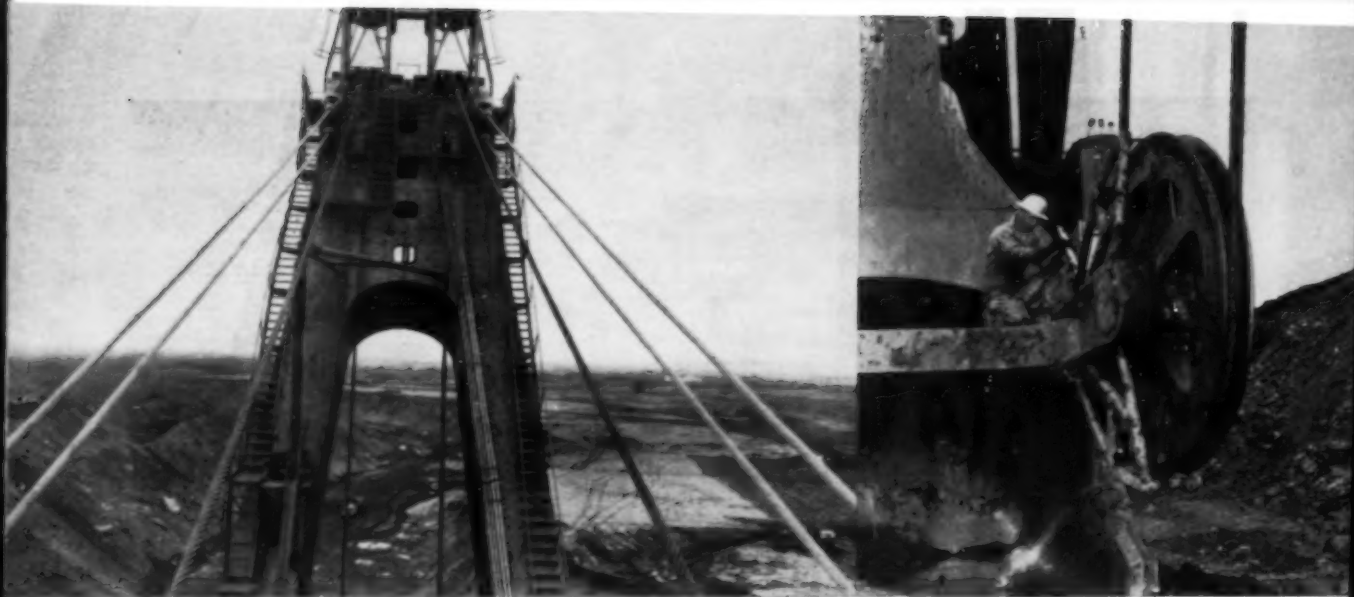
DRAVO
CORPORATION

Another "biggest" shovel flexes its wire rope muscles



...they're Tiger Brand, of course !





The giant boom towers 147½ feet from the ground and is supported by four 3½-inch Tiger Brand Galvanized Boom Supports designed to resist vibration and give long service life.

Two Tiger Brand hoist ropes, 2½ inches in diameter, do the heavy lifting. It is estimated that about 60,000 yards of overburden is being moved per 24-hour day. Coal production is expected to be 4,000 tons daily.

Put yourself into this picture for a minute. You are holding on to a railing 103 feet up in the "crow's nest" of one of the world's three largest shovels.

Just below you, the 2½-inch hoist ropes whirl through sheaves as the dipper rams into the hillside. You feel the big machine shudder as it scoops up 100 tons of rock and dirt. Then you swing with the load and see it dumped 96 feet high and 100 yards away. You wonder how the wire ropes that seem so small can lift so much.

The answer to that goes back to steelmaking and wire rope engineering. These USS Tiger Brand Ropes are specially designed for big

shovels. They have been used on the Mountaineer, River Queen, and Coal Chief—with outstanding success.

The huge boom is supported by four 3½-inch-diameter USS Tiger Brand Galvanized Boom Support Strands 105½ feet long. Each strand has a catalog strength of 768 tons, for a total strength of 3,072 tons.

Your equipment may not need such large wire rope, but the same quality of engineering that goes into these big shovel ropes is applied to all sizes of USS American Tiger Brand. For more information, write American Steel & Wire, Rockefeller Building, Cleveland 13, Ohio.

USS and Tiger Brand are registered trademarks

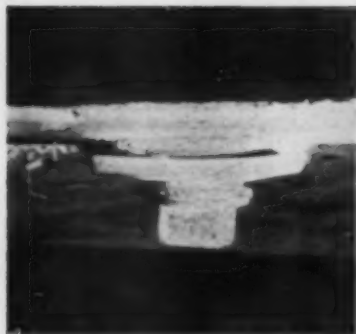
**American Steel & Wire
Division of**



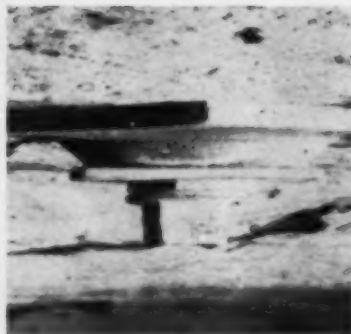
United States Steel

Columbia-Greene Steel Division, San Francisco. Pacific Coast Distributors • Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors • United States Steel Export Company, Distributors Abroad

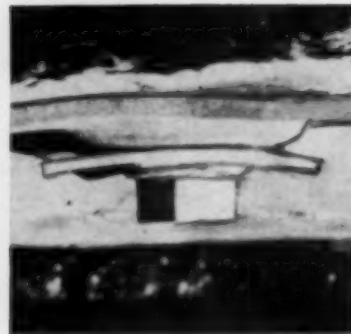
◀ **Another 70-cu.-yd. shovel.** Built by Marion Power Shovel Company for the Victoria Mine of Midland Collieries, Inc., subsidiary of Midland Electric Coal Corporation. The Victoria Mine is located near Galesburg, Ill.



INDICATOR CUPPED UPWARD indicates less than 8,000-lb tension on bolts.



INDICATOR FLATTENED shows desired tension of 8,000 lb at installation.



INDICATOR CUPPED DOWNWARD shows tension greater than 8,000 lb.

How Visual Tension Indicators Improve Roof Support With Bolts

Here is a first hand report on the increased effectiveness of roof bolting when visual tension indicators are used to indicate initial installation tension and show the effects of loosening or loading up after installation.

By **R. A. Gardner**, Chief Industrial Engineer, New River & Pocahontas Consolidated Coal Co., Capels, W. Va.

VISUAL TENSION INDICATORS have resulted in a major improvement in roof support with bolts at the No. 11 mine of the New River & Pocahontas Consolidated Coal Co., Capels, W. Va. The indicators elim-

inate guess work in installing roof bolts by showing bolt installation tension and by permitting a visual check on whether bolts have loosened or loaded-up after installation.

These general conclusions were confirmed by a formal test program conducted under the direction of J. L. Gilley, USBM, in cooperation with A. V. Gibson, general superintendent,

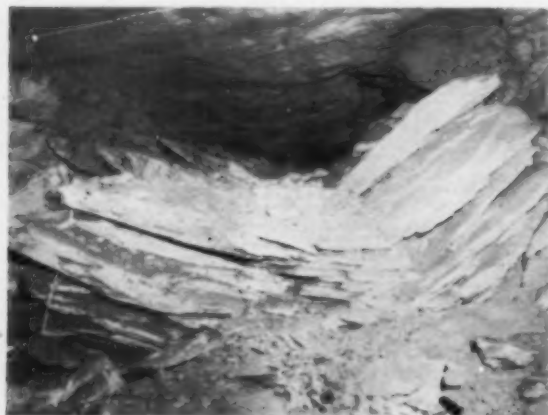
and O. C. Prickett, president, American Mine Supply Co., suppliers of the T-800 indicators. Specifically, the test program showed the following:

1. T-800 indicators will satisfactorily indicate proper bolt tension at the time of installation.

2. The indicators will show loosening or excessive loading after installation.

3. One indicator installed in every other row of bolts—roughly one per eight bolts—is sufficient in most cases. Applying the indicators in this manner would result in an added cost of 5c per bolt which would be much more than returned through improved roof support.

In addition to the final evaluation



ROOF FALLS such as the one shown above occurred regularly in every other breakthrough before indicators were used.



RESULT of using indicators was complete elimination of roof falls in the test area where falls normally would have occurred.

New River & Pocahontas Officials and Test-Team Personnel

L. J. Timms, General Manager
A. V. Gibson, General Superintendent
W. W. Gwinn, Superintendent
C. C. Harrison, Standards Department
C. A. Bailey, Standards Department
T. E. Musick, Standards Department

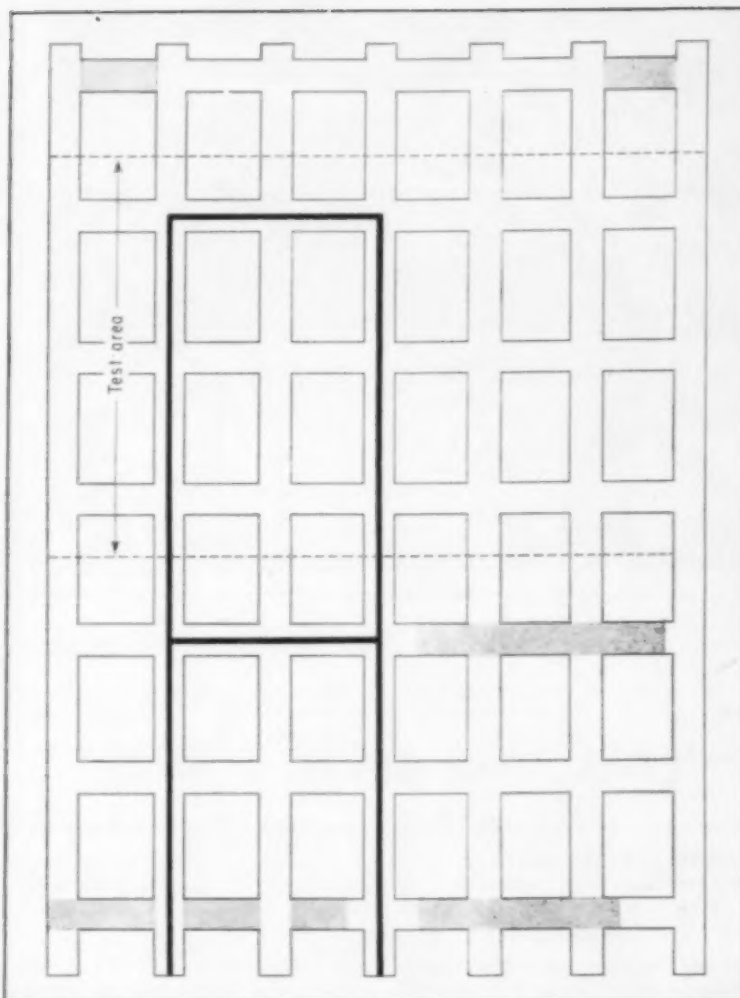
of the indicators, the company modified the roof-bolting machines, with resultant improvement in roof control throughout No. 11 mine as well as other mines owned by the company. The test also was, in part, responsible for improved bolting techniques, better bolting-machine performance and a general reappraisal of bolting plans. These revisions directly contributed to a greatly improved performance in the test section and indirectly to the best monthly production and performance during 1957.

Preliminary Test

Prior to conducting actual indicator tests, pull tests were made on several types of expansion shells installed with an initial torque of 150 and 200 ft-lb. This was necessary to determine the maximum anchoring capacity of the roof in the test area so that the correct tension indicators could be used. Since the torque corresponded to a tension of approximately 8,000 lb, T-800 (8,000 lb) indicators were specified for the test. Before the test, the company had been setting bolts to a tension of 6,000 lb.

Preliminary tests showed that the T-800 indicators, when tightened with a rotary roof-drill, would indicate a load of 8,000 lb plus or minus 900. This was far superior to the torque-tension relationship measured by a torque wrench to the extent: "175 ft-lb on a high-tension bolt will produce 8,050 lb plus or minus 2,750, 90% of the time," USBM R. I. 5228.

Several hundred torque-wrench readings had been taken and recorded at No. 11 mine without yielding any recognizable trends or guides that could be used to improve the bolting effectiveness. This was especially true of the 3-Main West section where large falls occurred every other breakthrough with few exceptions.



ROOF FALLS IN THE TEST AREA were completely eliminated with the aid of visual tension indicators. Area outby the test zone had a total of 33 falls in 25 breakthroughs. After the test, and when indicators were no longer used, falls began to occur with the same frequency as before.

Test Area

The No. 11 mine is located in the No. 3 Pocahontas seam. The test area averages 60 in in height. The immediate roof section is typical of roof throughout the mine except for a 4- to 8-in thick drawrock, compared to 10 to 18 in on other sections. This drawrock usually falls when coal is shot. It is more friable and crushes slightly when bolted in place.

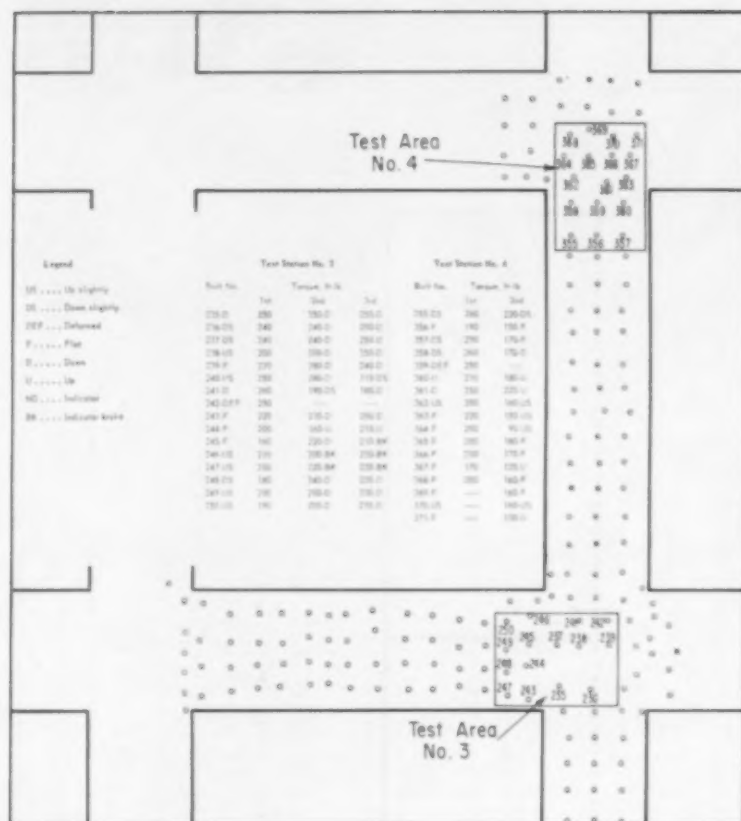
Visual Tension Indicators

The T-800 visual tension indicator assembly consists of a 3-in square, concave, spring-steel plate $\frac{3}{16}$ in thick with a 1 $\frac{3}{16}$ -in center hole.

The plate comes equipped with a cast flanged bushing or centering collar to center the plate and a 6-in square, $\frac{1}{4}$ -in thick, specially embossed steel bearing plate. The indicator is designed to flatten at an 8,000-lb tension. When the indicator is cupped upward the tension is less than 8,000 lb; cupped downward tension is greater than 8,000 lb.

Visual Test

Tests were made to determine what accuracy could be expected from the indicator as a visual gage of tension. The test included several methods. The indicator was tightened until observers decided it was



TWO OF THE TEN STATIONS in the test zone provided initial and two other torque readings which revealed how bolts loosened or loaded up after several weeks.

flat and the tension was read from a hydraulic gage. Results include readings taken when observers, totally untrained in this work, called the indicator flat. The best results were obtained when the indicator was flattened by tightening with a rotary roof drill, the normal method employed in the mine. Readings taken during this test are shown in the accompanying chart. The indicators proved to be 98.6% accurate in their ability to flatten at 8,000 lb.

Torque-Tension Relationship

A comparison of the torque-tension relationship of a bolt tightened without an indicator or hard washer and a bolt with an indicator showed that the T-800 required more torque to produce the same amount of tension compared to a bolt without a washer.

Two different-length bolts were used in the test area; heading No. 2, 4-ft bolts; heading No. 3, 4- and

5-ft bolts; and heading No. 4, 5-ft bolts. It was noted during the installation of the indicators that the 5-ft bolts required 200-ft-lb of torque to flatten the indicators while the 4-ft bolts required only 180 ft-lb. In a roof-bolting plan using mixed bolt lengths, the Visual Tension Indicator would be a better gage of tension than would a torque wrench reading, since there is a large percentage of error inherent in their use.

Final Test

In the test area, 1,035 indicators were installed. Each indicator was checked. Recorded data included location of indicator, shape (up, flat or down) and amount of torque.

Ten test stations were established throughout the area and spaced approximately 80 ft apart. These stations contained 130 indicator assemblies or about 13% of the total. Checks were run at the test stations

Torque-Tension Relationship¹

Test No.	Tension, lb			Torque, ft-lb (Indicator flat)
	Up	Flat	Down	
1....	4,900	8,000	10,000	115
2....	6,000	8,000	9,000	115
3....	6,000	8,300	9,200	150
4....	5,400	8,000	9,100	140
5....	5,500	7,100	8,900	115
6....	4,500	7,300	8,900	—
7....	5,700	8,500	10,000	125

¹ Bolts tightened with rotary roof drill.

weekly to obtain a representative picture, as it was impractical to check each of the 1,035 indicators that often. Data on three of the test stations are shown on the accompanying map.

In addition to the regular inspection of indicators each shift, C. A. Bailey and T. E. Musick, of the standards department assisted in taking hourly hydraulic-oil temperatures and torque readings on the drills. It was observed that the temperature of the oil increased to comparatively high degrees after 4 or 5 hr of operation, while the torque decreased to a point where the machine did not deliver sufficient torque to flatten the indicators. This information was forwarded to the machine manufacturer and resulted in an improved hydraulic motor which reduced the hydraulic pressure from 1,700 to 1,200 psi. This increased the torque to 300 ft-lb and during the remainder of the experiment, the machine was capable of delivering sufficient torque consistently to flatten the indicators. This change was subsequently made in all drilling units throughout the company.

The outstanding result of the use of Visual Tension Indicators was complete elimination of roof falls in the test area, thus increasing production by eliminating lost time cleaning up and going around roof falls. As an example, the area outby the test zone (see map) had a total of 33 falls in 25 breakthroughs. Very seldom could the section be advanced more than one breakthrough without a roof fall. Additional proof that the indicators improved roof bolting was obtained when, at the conclusion of the test, the company stopped using indicators and found that roof falls began to occur with the same frequency as before.



EASY TO INSTALL G-E Cabinetal® control requires minimum of maintenance. Centralized panels are adaptable to any type of sequencing.
* Registered Trade-mark of General Electric Co.



DEPENDABLE POWER to drive a slope belt, which moves coal from mine to plant, is provided by 200-hp General Electric Type KG high-starting torque motor.



RELIABLE PERFORMANCE in any weather is provided by these three G-E 833-Kva transformers which deliver uninterrupted power for Moss #2 preparation plant.



EASILY OPERATED main control panel, engineered by Link-Belt Company using G-E components, functions as nerve center for coal preparation plant operations.



MODERN, EFFICIENT G-E power system helps achieve production of 6500 tons per day.

Efficient G-E electrical system helps
Clinchfield Coal's Moss #2 produce ...

6500 tons per day— automatically

Moss #2—from mine through preparation plant—is electrically equipped by General Electric, to meet increasing production demands

To meet steel industry demands for a high quality metallurgical coal, Clinchfield Coal Company, division of the Pittston Company, opened Moss #2 mine, Russell County, Virginia, in 1956. To achieve a high degree of production, a new, fully automatic coal preparation plant with a capacity of at least 6500 tons per day was constructed.

Working closely with the Link-Belt Company—which designed and built the complete, automatic preparation plant—as well as with Clinchfield engineers, General Electric engineered an electrical system to handle today's production requirements with built-in capacity for tomorrow's needs.

Ranked as one of the coal industry's most modern mines, Moss #2 is an excellent example of the progress made in the application of electrical equipment to coal preparation plants.

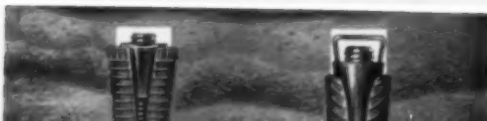
Your nearest G-E sales representative can call in General Electric application engineers to help design an efficient electrical system for your plant. Call on him early in your planning stage.

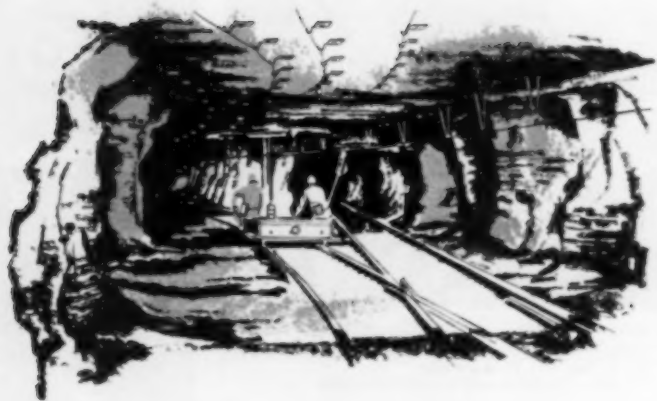
For free copies of bulletin GEA-5308A, Modern Electrical Systems for Coal Preparation Plants, write to General Electric Co., Section 663-50, Schenectady 5, New York.



Engineered Electrical Systems for the Coal Mining Industry

GENERAL  ELECTRIC





*Get instant visual
indication of bolt tension with . . .*

NEW YOUNGSTOWN VTI

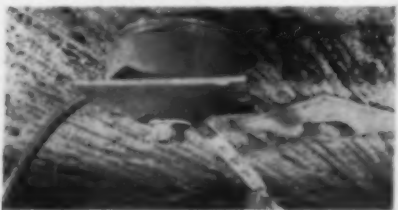
At the Nemacolin Mine of Buckeye Coal Co., Nemacolin, Pa., tests were recently conducted on 5/8-inch VTI Roof Bolts by the United States Bureau of Mines. They clearly show how the VTI (Visual Tension Indicating) feature provides a simple, fool-proof and economic means of assuring a predetermined minimum load.



VTI Bolt head showing crimping prior to loading. Air cylinder for tension testing is placed between roof and bolt plate.



Bolt head—loaded to 5,000 pounds—shows crimp beginning to flatten (note gauge reading).



At 6,100 pounds, crimp flattens completely.

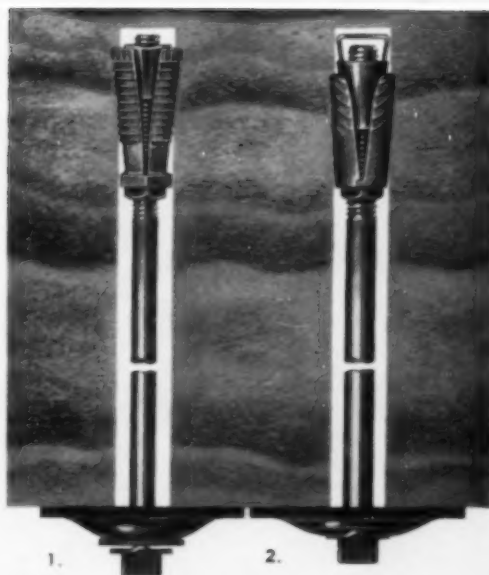
Youngstown VTI Mine Roof Bolt Patent Pending.



Youngstown VTI Mine Roof Bolts are available in 2 Standard sizes:

1. High Strength $\frac{3}{4}$ " diameter Roof Bolting Assembly.
2. Regular Strength, $\frac{3}{4}$ " diameter Roof Bolting Assembly. (#1 and #2 Bolts feature square heads, with integrally forged washers. Their long rolled threads are heavily coated with a rust preventive. Lengths from 28 to 84 inches. Mine Roof Plates—of Dish-Embossed, Bell and Utility types—are furnished with $\frac{3}{4}$, $\frac{1}{2}$ and $1\frac{1}{2}$ -inch centrally punched holes.)

All Youngstown Mine Roof Bolts are available with either standard or VTI heads.



MINE ROOF BOLTS



Check These Advantages of Youngstown's New VTI (Visual Tension Indicating) Bolt Heads

When VTI crimps flatten, tension is 5,500 pounds to 6,500 pounds. It provides a definite visual indication that the bolter has tightened the bolt and that its anchorage is strong enough to support the required tension.

If VTI bolt crimps have not flattened, the bolt has not been tightened to required tension. This may be due to:

1. Carelessness of bolters
2. Equipment out of order
3. Insufficient anchorage
4. Hole diameter too large
5. Defective anchorage material
6. Improper use of equipment
7. Inexperienced bolting crew

Make sure you have a check on all these by using Youngstown VTI Bolts.



Youngstown VTI Mine Roof Bolts are available with $\frac{3}{4}$ and $\frac{1}{2}$ -inch diameters in a wide range of workable lengths.

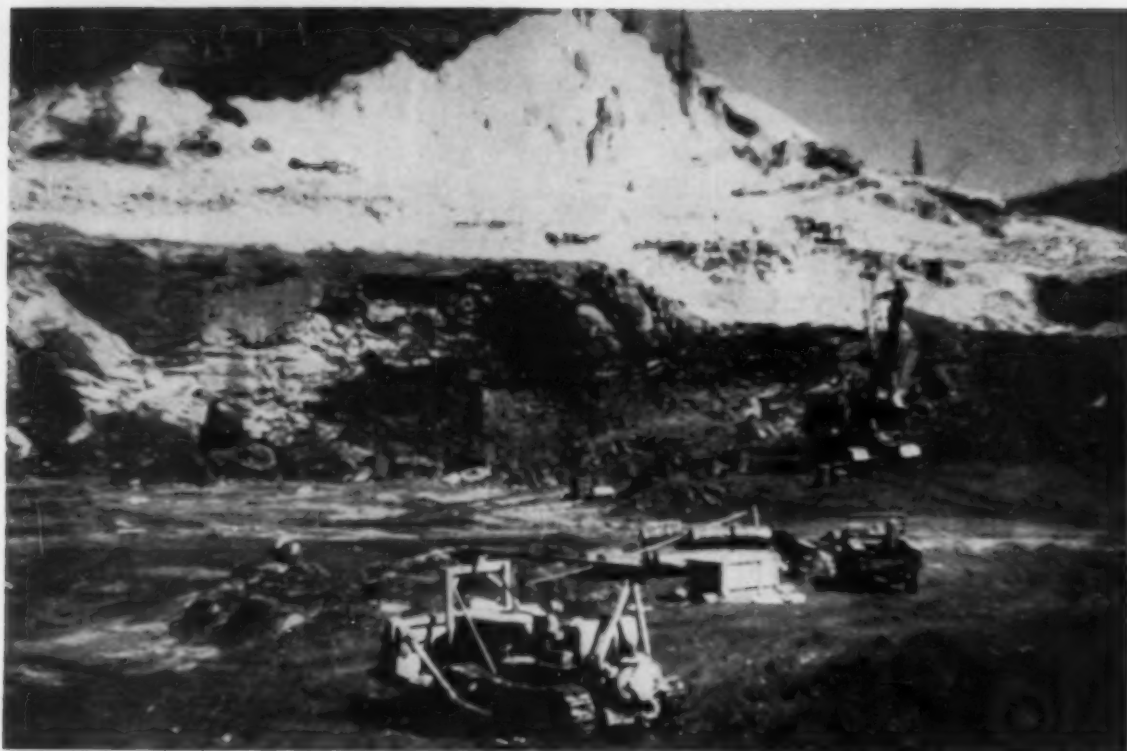
You'll find one to fit any roof condition encountered in today's high-production mines.

Physical properties of all Youngstown VTI Roof Bolts easily meet or exceed Specification ASTMA-306 as outlined by the Committee on Roof Action.

Take advantage of the highest standards of *quality*—the personal touch in our metallurgical *service* by specifying Youngstown VTI Mine Roof Bolts for your next roof-support job. For additional information, call or write today to our Home Office at Youngstown 1, Ohio.

THE YOUNGSTOWN
SHEET AND TUBE COMPANY

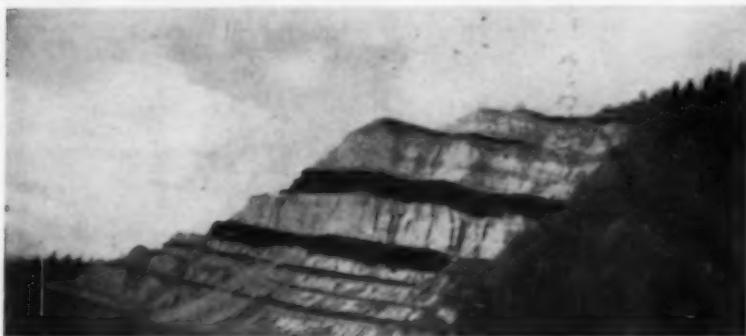
Manufacturers of Carbon, Alloy and Tool Steel
Youngstown, Ohio



PIT VIEW, showing coal face in No. 2 pit and part of the equipment, including loading shovel. Overburden was hydraulicked, bulldozed and scraped to uncover the coal for loading with shovel and front-end equipment.

Hydraulicking and Scraping Remove Burden at Arctic Coal

Recovering 40-ft seam pitching 10 to 15 deg, Nenana Operating Co. uses hydraulic giants and scrapers along outcrop, and drills coal with overburden-type machine.



ON LIGNITE CREEK—outcrop of part of the beds on the Arctic Coal Co. lease. Thickness ranges from 5 to 40 ft and the beds dip down 10 to 15 deg from the outcrop.

OVERBURDEN REMOVAL by a combination of hydraulicking and scraping features stripping at the property of the Arctic Coal Co., Inc., on Lignite Creek off the Nenana River, 108 mi south of Fairbanks and 246 mi north of Anchorage, in Alaska—newest of the 49 states of the United States of America.

The Arctic Coal Co. was organized in the spring of 1954 and started operations in that year. Mining operations have since been contracted to the Nenana Operating Co., Inc., a partnership of Carl M. Pederson and James A. Carroll, with Mr. Carroll functioning as president. Nenana took over the operation in 1956, and since has added, among other equipment, two loading units and a crusher, in addition to a camp and other surface facilities.

Location of the property is at Lignite, on the Alaska R. R., and the coal deposits, leased from the U. S., extend from 4 mi east to 6 mi east of the railroad. The lease covers 2,440 acres on Lignite Creek. Aside from tonnage that could be recovered by underground methods, it is estimated that coal available by hydraulicking and scraping totals 22 million tons. Six beds are involved, with reserves ranging from 500,000 to 7,250,000 tons each.

Production presently comes from the "Basal" or "A" bed, the lowest known bed in the Nenana field. Other seams found above the Basal bed on the property are the "B," "E," "F," "G" and "H" ranging in thickness from 5 to 35 ft. Thickness of the Basal is 40 ft at the present mining location. The product is subbituminous in type, and the output rate with present equipment is approximately 150,000 tons per year. Moisture ranges from 23 to 26%, as-received; ash, on the same basis 3 to 9.5; Btu, 8,261 to 9,300 (11,176 to 12,274, moisture-free).

Utilities and military establishments are the principal customers, taking primarily 4x0 or 2½x0. Processing consists of crushing in a two-stage Gundlach machine and then screening on a Simplicity vibrator into the desired sizes. After preparation, the coal is moved across the Nenana River and its flood plain by a 1,100-ft Riblet reversible aerial tram with a capacity of 60 tph. From the tram it is trucked to the company's 20-car railroad siding.

The seams outcrop in the mountain-side, and pitch down some 10 to 15 deg. Thus, removal of the overburden to a height of 100 ft uncovers a cut of coal some 200 to 300 ft wide.

Hydraulicking and Scraping Removes Overburden

The overburden consists of a poorly consolidated sandstone and gravel mixture over a layer of clay 0 to 20 ft thick. The first operation in opening a cut is bulldozing moss and trees off the surface. Next, No. 2 Monitor hydraulic giants are brought into play and the sand and gravel are hydraulicked off down to the clay. With a nozzle pressure of 90 psi and a flow of 3,000 gpm, one giant can move around 200 cu yd per hr. Finally the clay is bulldozed or scraped off, using D8 machines alone or with scrapers



FRONT-END MACHINE adds flexibility to the loading setup at the Arctic Coal Co. operation. Hauling is handled by 15-ton end-dump trucks, discharging at preparation plant.



NENANA MANAGEMENT—Carl M. Pederson (left) with partner James A. Carroll (right) discuss plans with William Jansen, of the supervisory staff.

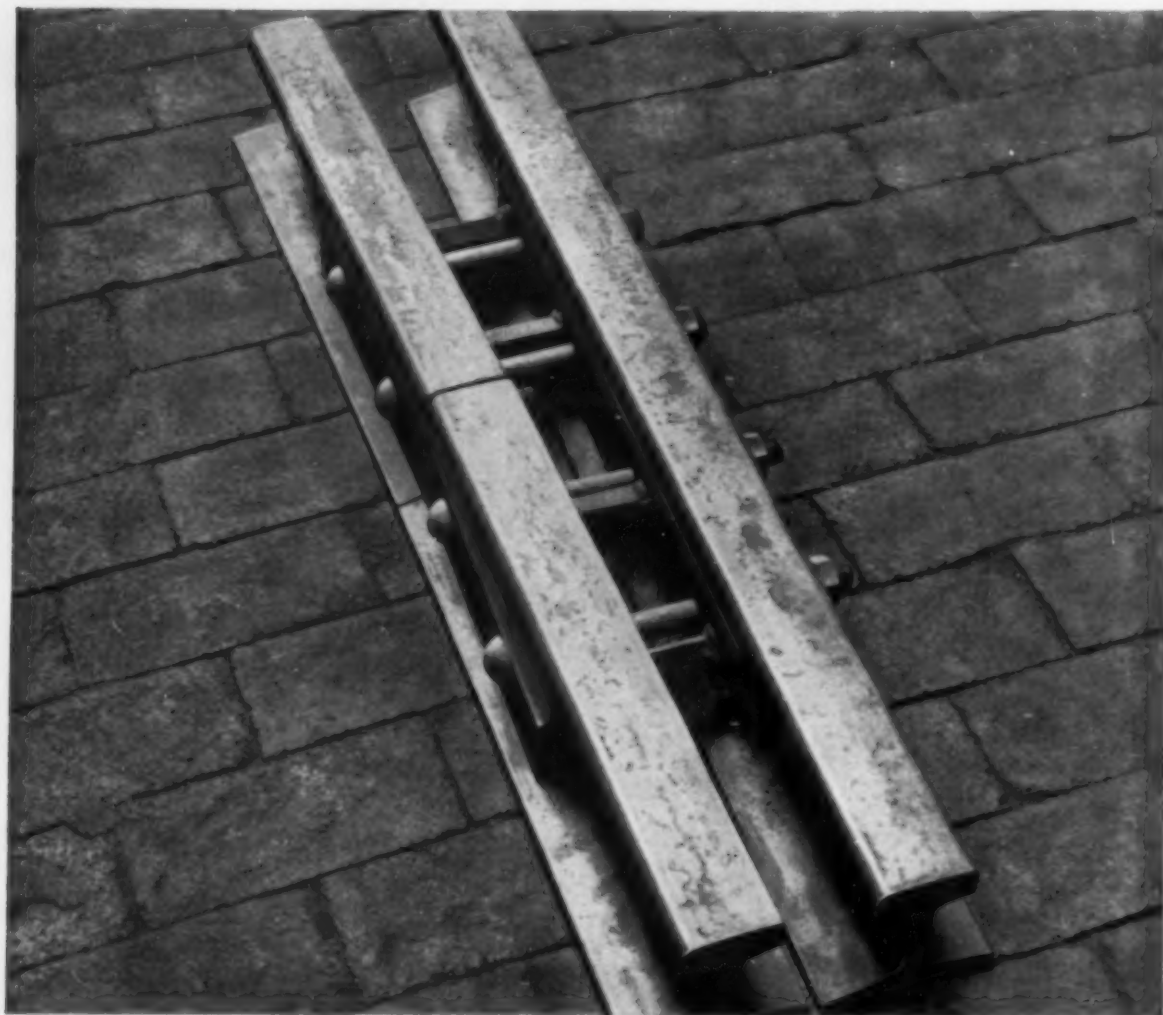
and, for the longer hauls, Tournapull equipment. Stripping naturally is limited to the summer months, with loading the primary operation in winter.

Drilling preparatory to breaking the 40-ft-thick seam for loading is done by a 6-in McCarthy horizontal drill. Hole depth is approximately 36 ft. Spacing normally is 8 ft, and the holes are loaded with a 300-lb charge of one-third Apex and two-thirds Amocoal.

Loading is done with an 80-D Northwest shovel supplemented by an

Allis-Chalmers HD-6C front-end loader. The latter provides extra flexibility in the loading arrangements, and has functioned without difficulty during temperatures of as low as 60 below. Lubrication requirements are \$5 worth of materials and ¼ hr of labor for each 1,000 hr of operations with the unit.

Haulage is handled by five Mack NR-8 trucks, each with a capacity of approximately 15 tons. Average haul to the plant, over all-year highways, is 4½ mi.



The how and why of Bethlehem Switch Heel Blocks

This shop-assembled sample clearly shows the how and the why of Bethlehem's new Switch Heel Block Design 992, which was developed especially for use with mine turnouts. When properly installed in the turnout, as shown, the 992 helps maintain heel spread and track gage at the heel end of the switch, keeping closure rail and switch point in correct alignment both vertically and horizontally.

Included with the sample are short lengths of rail, serving as stock rail (right), closure rail (upper left) and switch point (lower left). Assembly is a quick and simple matter and results are foolproof.

The block itself is the sturdy little weldment between rails. Two bushings welded to the left-hand side of the block slip through holes drilled in the

switch point, thus permitting the bolts to be drawn up tight without hindering normal lateral movements of the points.

The Design 992 can be furnished to fit switches of any length and rail from 40 lb per yard and up. It can make an important contribution to the smooth, fast and efficient transportation your mine wants and needs for up-to-the-minute operations. A Bethlehem engineer, located in a nearby district office, will be glad to discuss the Design 992 Switch Heel Block in terms of your particular requirements.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold
by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



YOUR GRADER—

Chances are, you consider a grader a maintenance tool... a kind-of "necessary evil." But is it just that?

Think how a grader keeps haul roads in top-speed shape — thus increasing the number of round-trips your haulers can make daily. Or think of the extra working days you gain because ditches, cut by a grader, let water run off faster.

Objective... increased production

The net result of most grader work in mines, quarries, and pits, is higher output... increased production. In a sense, the extra tonnage you get — due solely to work of your graders — is really *their* production. It's output you wouldn't get without graders... couldn't get without added expense.

So! While your grader may be a "maintenance" tool in function, it is actually a "production" tool in results. That's why you will want to select your graders carefully, on the basis of work-output. You'll want machines that can handle *all* your blade-work *fast*... that can help you get the "last ounce" of tonnage with your production equipment.

L-W "660" does more work, faster

You'll find that a big L-W Adams' 660 grader can cut deeper, push more dirt, move it faster than other graders of similar size, price, and power. "660" gives you greater work-output than others — mainly because of its wide selection of power-speed combinations, which let you do more of your work at full engine-power. The L-W grader also provides extra, faster forward and reverse speeds to save you time on traveling, maneuvering, and backing-up for the next cut.

This profit-boosting grader is offered in 2 power options: Standard "660" with 160-hp diesel and constant-mesh transmission, or POWER-Flow® 660 with 190-hp engine and torque converter. Five other L-W Adams model graders — 60 to 135 hp — also available.

Call or write for complete information about features that make LeTourneau-Westinghouse machines the most profitable graders you can own.

PRODUCTION TOOL? ...or OVERHEAD?



†Trademark G-1884-MQ-1



LETOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit

PORTABLE, DURABLE, ECONOMICAL

...ALCOA ALUMINUM PIPE
FOR TEMPORARY WATER SUPPLY,
DRAINAGE, COMPRESSED AIR,
STEAM OR FUEL LINES



When portable piping plays a major role in keeping your operations on the move, specify light, strong ALCOA® Aluminum Pipe. Here's why:

PORTABLE . . . One man can easily handle several standard lengths of ALCOA Aluminum Pipe. Small crews can quickly and easily lay long lines of pipe. Pick-up and relaying is easily accomplished to keep pace with moving jobs.

ECONOMICAL . . . Handling by small crews means low laying costs. Long service life adds extra savings.

DURABLE . . . Rugged ALCOA Aluminum Pipe stands up well under heavy abuse. And it's highly resistant to corrosion under the most severe conditions.

Operating efficiency of ALCOA Aluminum Pipe is excellent . . . same friction factor as smooth drawn tube of other metals insures low loss of head.

AVAILABLE . . . ALCOA Aluminum Pipe and quick couplings of aluminum are immediately available through a nationwide network of distributors. You will find them listed under "Pipe" in the Yellow Pages of your telephone directory. Check your nearest distributor for detailed specification data. Or mail the convenient coupon.

Aluminum Company of America
924-J Alcoa Building, Pittsburgh 19, Pennsylvania

Please send me your free booklet describing portable piping of Alcoa Aluminum.
I need low cost, portable piping for the following services:

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____



"ALCOA THEATRE"
Exciting Adventure
Alternate Woody Evenings

New, low-cost way to improve haul roads

There is new emphasis, these days, on road-maintenance in mines and quarries. Many pits now use blading equipment full-time on haul routes. Others are hard-surfacing their roads. Reason: auto and tire makers have proved that maintenance costs far less than slow hauling, excess tire wear, and equipment breakdowns caused by poor roads. Good haul surfaces boost production, lower equipment up-keep costs.

You can keep haul roads smooth, fast, safe, at rock-bottom cost... with no "extra" equipment, no more man-hours than you're now paying for, and no new personnel. Next time you replace a crawler-tractor, replace it with rubber-tired Tournatractor®. This LeTourneau-Westinghouse machine will handle all the work of the rig you trade in, and, because of its extra speed, take on a regular road-maintenance program as a "bonus" service.

Move it anywhere... profitably

Key to this "double duty" ability is the fact that, unlike crawlers, Tournatractor is not "tied down" to one location, or one job, in your pit. Because it travels at 17.2 mph, you can move it around at will... easily, quickly, efficiently. Tournatractor can often leave its "regular" job, get to any part of your road system in a few minutes, do a quick maintenance job, and return to its normal assignments before it is missed.

Trying the same plan with a track-rig rarely works. First of all, you seldom can spare the time a crawler needs to get anywhere. And if you do have time, the 5-to-6 mph crawler spends most of it just traveling. Also, scheduling a crawler on a 4 or 5 mile per day travel circuit costs plenty in track wear and repairs.

Time for roadwork easy to find

Finding time for Tournatractor's roadwork is easy. This high-speed unit can clean up at several shovels, still find time to do roadwork—plus other plant and stockpile clean-



Instant-shift, positive brakes, and electric blade control, plus speeds to 17.2 mph, make Tournatractor a fast worker. It's rugged, too. And, in a few minutes, it can leave its regular assignment and run, at 17.2 mph, to

dig a drainage ditch, smooth a rutted road, clean silt off a bench, tidy up a stockpile, or do other tractor work. This "extra" service costs you nothing in added investment, operating cost or added personnel.



up—in-between clean-up sessions along the working face. Many pits have found that just one Tournatractor can replace two or three crawlers and handle all "miscellaneous" grading and pulling jobs as well as shovel clean-up.

For all its mobility and speed, Tournatractor is a hard worker, too. Mas-

sively, ruggedly built, it offers 210 hp... delivered through an anti-friction drive and torque converter to four, wide, low-pressure tires... for positive traction on any surface.

Let us send you complete details on how "go anywhere" Tournatractor can easily handle road maintenance in your pit at no extra cost.

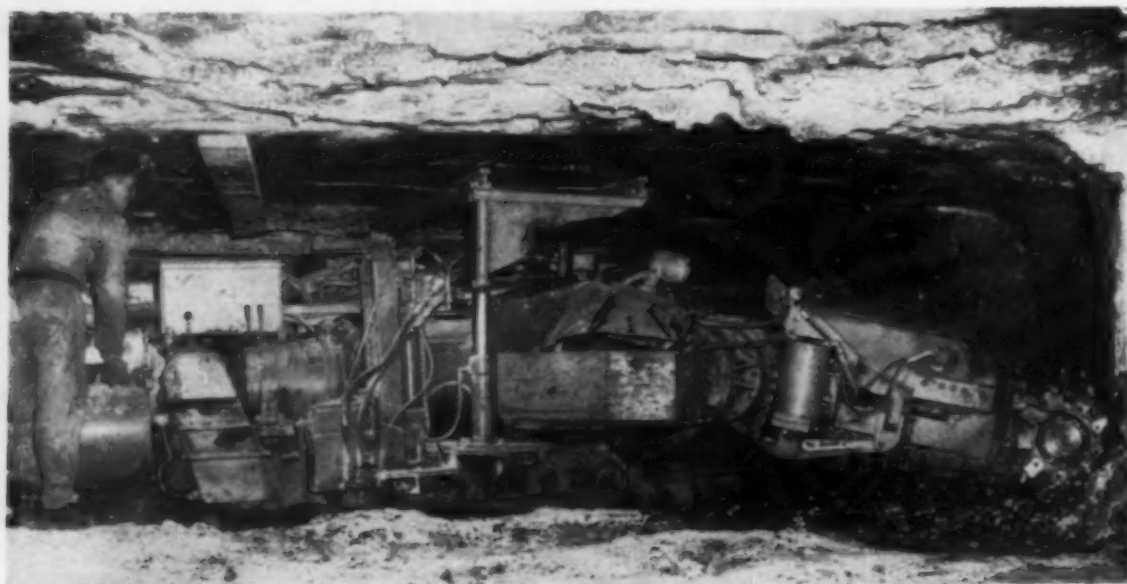
CT-1647-MQ-1



LeTOURNEAU-WESTINGHOUSE COMPANY, PEORIA, ILLINOIS

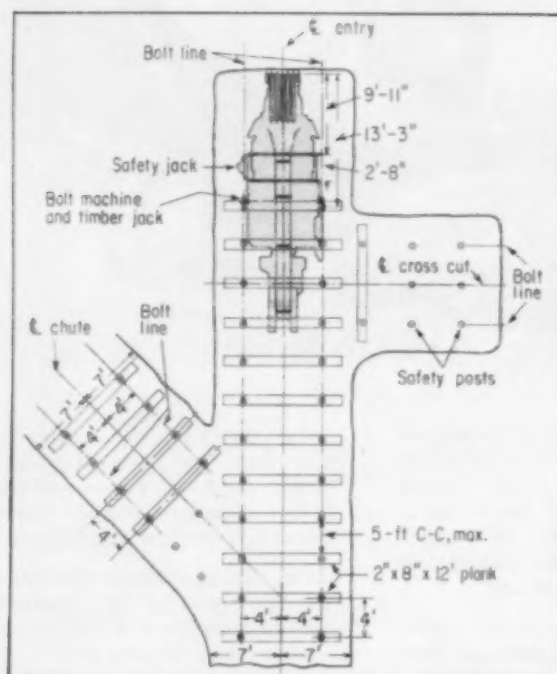
A Subsidiary of Westinghouse Air Brake Company

Where quality is a habit



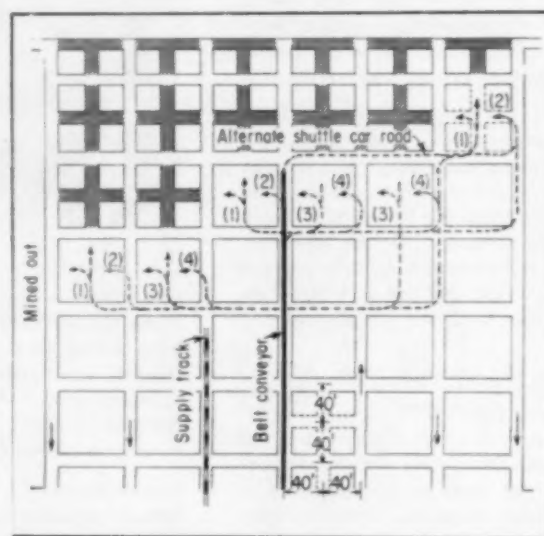
PROTECTION at face includes planks secured by bolts and two steel rails held up by hydraulic jacks on miner.

Safety Features in the Design and Development of Ireland Mine



ROOF BOLTING PLAN requires 2x8-in by 12-ft planks on 4-ft centers in all working places.

By G. W. McCaa
General Manager, Hanna Coal Co., Division of Consolidation Coal Co., Moundsville, W. Va.



MINING PLAN for butt entries includes driving seven headings and partially recovering pillars by splitting.

THE IRELAND MINE is a new operation of the Hanna Coal Co., Div. of Consolidation Coal Co., and is located in Marshall County, W. Va., seven miles south of Moundsville, and adjacent to the Ohio River. This mine is being developed to meet the demand for coal in the industrial expansion of the Upper Ohio Valley. The coal from Ireland mine will supply the Kammer power plant of the American Gas & Electric System, which is a large plant being built primarily to supply power for the new Olin-Revere aluminum plant. Plans for the design and development of this mine were started in November 1955. Construction of the surface facilities, shafts and slopes were started in January, 1956; first coal was produced October 15, 1956.

In designing and developing this mine our aim has been to make it the safest and most efficient mine possible. Safety in the design of all equipment and mining plans has been given primary consideration to protect the lives of the employees. It is also self-evident that you cannot have an efficient mine without having a safe operation. The fact that Ireland is a completely new mine with all new equipment, has made it possible to incorporate the safest possible methods and devices.

Roof Control

The most serious safety consideration is the protection of the underground employees from falls of roof and rib in the working face area. The Ireland mine is being developed in the Pittsburgh, No. 8 coal seam, and in this area the seam is approximately 5 ft thick. Immediately above the seam is a strata of draw slate that ranges from 0 to 48 in. The draw slate is very weak and must be supported if mining is to be conducted under it. Above the draw slate is a seam of coal from 1 to 2 ft thick. The next strata is a mixture of shales from 8 to 10 ft thick, which is a very poor structure. Above this strata is a thick bed of limestone which is strong and fairly uniform.

In our original mining plans we decided that we would employ continuous mining machines to the fullest extent possible. We would try to operate them under the draw slate



SATELLITE BOLTERS driven hydraulically from boring-type miner operate independently as unit advances in coal.



PRODUCTION UNITS at Ireland mine include boring- and ripper-type continuous miners. Equipment is powered by AC motors.

safely by the use of roof bolts, or the combination of roof bolts and timber. At the time the coal was reached in the development of the mine, the only continuous miner that was applicable to the height of seam and could be adapted to supporting the roof was the ripper-type continuous miner. The manufacturer had not designed roof bolting equipment to be used on this machine. When the original mining was started, we supported the draw slate with crossbars and posts. We found that the draw slate could be supported with crossbars and posts, but it soon became loose and sagged down on the timbers, presenting a very dangerous condition in case a post or bar was knocked out by any of the mining equipment. The continuous miner was followed up with a conventional rubber-tired roof-bolting machine, which installed $\frac{5}{8}$ -in 1040-steel bolts

6 ft long. The bolts successfully held the draw slate. The places were approximately 16 ft wide and bolts were placed on 4 ft centers in rows 4 ft apart. When this was done we found that the draw slate did not become loose and the support appeared adequate. The roof bolting, however, was a separate operation and did not protect the operator of the continuous mining machine while he was working at the face. By utilizing the power from one of the cutter motors to drive a hydraulic pump with V belts, it was possible to design hydraulic roof bolting equipment that would fit within the space available on the machine. Two roof bolting units, one on each side of the machine, were installed in place of the hydraulic timber jacks. This permitted roof bolts to be installed ahead of the operator and within 13 ft of the working face. The

Adapted from a paper presented at the 1957 National Safety Congress.

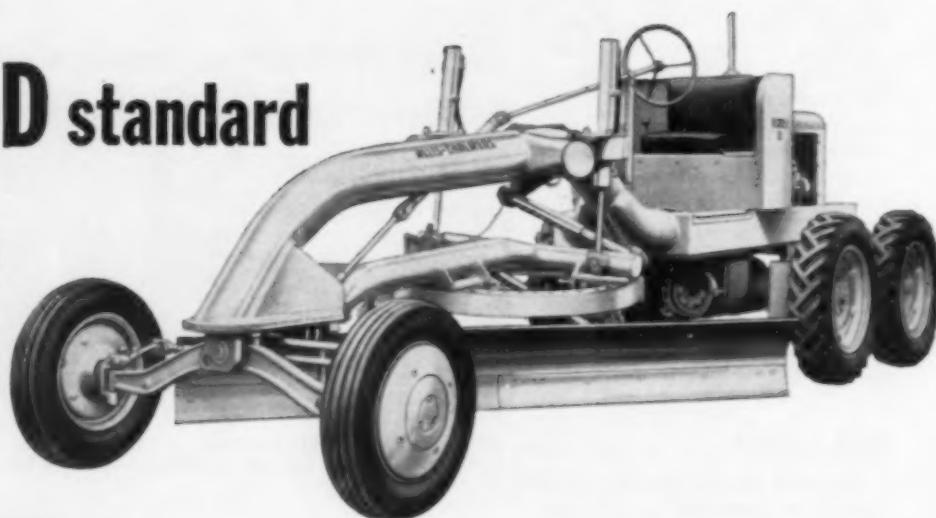
...for big economy on maintenance

GET THE ALLIS-CHALMERS

Here's the original low-cost motor grader with big-grader design and performance advantages. The Model D handles so many jobs so well, you have to see it at work to convince yourself. Your Allis-Chalmers dealer can arrange a demonstration. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

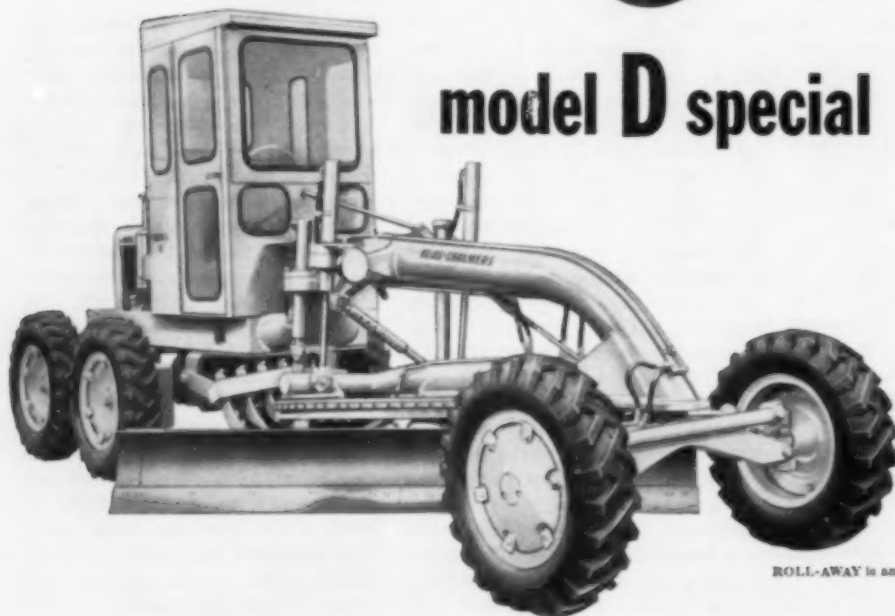
model D standard

50 hp
Approx. weight
8,800 lb (gasoline)
Approx. weight
9,350 lb (diesel)



model D special

50 hp
Approx. weight
10,900 lb (gasoline)
Approx. weight
11,450 lb (diesel)
4 forward speeds to 25
mph (approx.)
1 reverse speed to 3
mph (approx.)
All-steel cab*
Shiftable moldboard*
Hydraulic scarifier*
Leaning front wheels*
Power circle turn*



*Also available with
the model D standard as
optional equipment.

ROLL-AWAY is an Allis-Chalmers trademark.

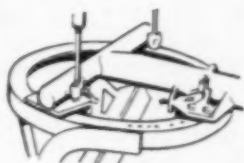
and construction work

MODEL D MOTOR GRADER

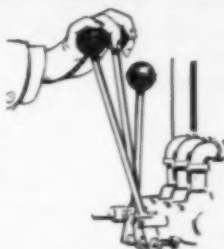
many production-boosting advantages



The ROLL-AWAY moldboard rolls dirt up and ahead to eliminate packing, reducing friction . . . gives you more performance per horsepower, more production per gallon of fuel.



Revolving circle and heavy tubular drawbar provide exceptionally stable moldboard mounting.

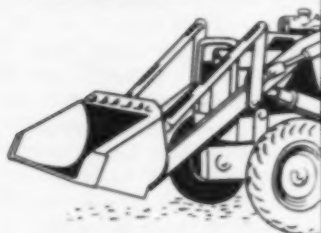


Convenient hydraulic controls, easy to operate. Two levers fit into one hand to control circle lift.

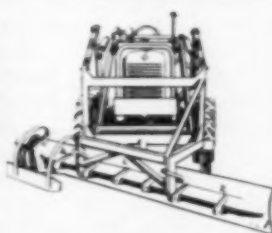


Positive tandem drive gives you four driving wheels under the heavy end of the grader.

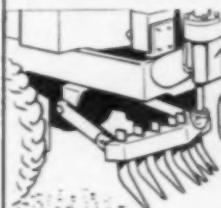
many job-multiplying attachments



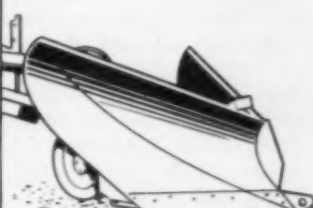
1/2-yd rear-mounted loader



Interchangeable shoulder maintainer



Midship-mounted scarifier



Blade and V-type snowplows

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

Look ahead... *move ahead*...and stay ahead

with **ALLIS-CHALMERS**



hydraulic timber jacks were moved to a position approximately 2 ft ahead of the roof bolters, and two 60-ft rails were installed on the jacks as crossbars to protect the roof bolters. This unit was put in operation with two bolts installed 8 ft apart through a 2x8-in by 12-ft hardwood plank. These planks were installed on approximately 36-in centers. This was purely an experimental method of supporting draw slate, and at the start crossbars and posts were installed between the planks. Several crosscut lengths were driven in this manner. It was soon evident that the planks and bolts were supporting the draw slate and the posts and crossbars were not necessary. When the bars and posts were removed, it was found that there was no movement of the draw slate and the bolt and planks were doing an adequate job. Since that time approximately 50,000 lineal feet of entries and crosscuts have been driven using this method, and although we have experienced slate falls at the face ahead of the roof bolting, there have been only five small falls of roof where the area has been bolted. These falls have generally occurred where there was a slip or abnormally thick draw slate. One item of interest is that in all cases there has been warning of the impending fall, and the bolt and planks worked for a considerable time before the fall occurred. Some of these falls can be attributed to improper installation of roof bolts or spacing planks too far apart under heavy draw slate.

We are, at the present time, experimenting with a continuous miner of the boring type, using the same type of roof support, except in this case it is not possible to attach the bolters to the machine as the machine is continuously moving forward. The bolters are satellite units which operate independently but are attached to the machine with a hydraulic jack and rope. The roof bolters install the bolts and planks as the miner continues to advance. When the bolting operation is completed, the bolting units are pulled ahead with the rope and hydraulic jack to the next hole.

Main Haulage Support

The roof of main haulage roads and air courses cannot be supported for the life of the mine in the above

manner. Additional height is also required on haulage roads. Since Ireland mine will possibly have a life of from 50 to 100 yrs, it is necessary to plan the best possible method of maintaining the main entries. Our original plan was that we would shoot down all the strata above the coal to the limestone and use the limestone as a permanent roof. The ribs and roof would be protected from weathering with wire mesh and guniting. At the bottom of the supply slope the construction of our main entries was started in this manner. Removing the strata above the coal proved to be a slow and very dangerous job. The scaling of the ribs after the shooting and a subsequent loading of this material, was very hazardous. We experienced one fatality due to the operator not taking down a rib which had become loose in this operation.

Shortly after this method of developing the main line began, we observed that the ribs and even the limestone, started to weather and there was a continuous loosening of ribs and roof. In adjacent places which had been mined with a miner and the draw slate bolted, very little weathering of the draw slate was observed and no falls were encountered. We soon decided that the shooting of the roof had opened up cracks which was conducive to the weathering of the ribs and roof. The only strata between the coal and the limestone that does not readily weather is the 1 to 2 ft of roof coal directly above the draw slate. If this coal strata could be held by roof bolting, safe haulage roads and air courses could be maintained. A continuous miner was taken off of production and placed on the job of ripping down the draw slate which had been left up in primary mining. The roof coal was then bolted, wire meshed, and gunited. To obtain haulage height, the bottom was graded with as little shooting as possible. We now have about 1,500 ft of this construction work completed and an additional 3,000 ft where the draw slate has been ripped out with continuous miner and rebolted.

In comparison with the haulage entries that we had taken to the limestone, it appears that this method of supporting the main entries will be more successful. It is our belief, that the fact that we are not doing

any shooting which would tend to crack the roof or ribs, will greatly reduce the number of falls in air courses and along the haulage road. When the preparation plant is in operation we plan, on main haulage roads and air courses, to rip the slate down when the coal is mined. This will eliminate the double operation of mining the coal and brushing the top separately.

Mining Plans

The use of continuous miners and the heavy cover over the coal seam at Ireland mine made it necessary to consider changes in the mining practices as compared with the conventional plans normally used in the Eastern Ohio Section of the Pittsburgh, or No. 8 seam. Pillaring has never been successful in this area, and although pillaring will be tried in this mine, the general plan of mining is projected for partial recovery. Observations of the mining conditions and the methods used in the relatively shallower cover in Eastern Ohio and the W. Va. Panhandle, convinced us that the wide room with the narrow pillar would not work successfully under the 1,000 ft cover that will be encountered at Ireland mine.

The following plan of mining has been projected and will be started in 1958. It is planned to drive working panels of six or seven headings on 80 ft centers approximately 2,000 ft long. Each panel will be driven with three continuous miners with the coal hauled from the miner by shuttle cars to a 36-in conveyor belt. The reason for using three continuous miners on a panel is to get the most rapid extraction possible. When the panel is developed, each of the 64-ft square blocks will be split both ways, leaving four square stumps. These square stumps will give the maximum roof support with a maximum amount of recovery. Three miners will be used also on the retreat work, and it will be possible to develop and work out a 2,000 ft panel in approximately 60 working days. The rapid extraction and the method of leaving square stumps on the retreat, we think is necessary if our method of supporting the draw slate with bolts and planks is to be successful. Future experience will dictate the centers on which these

blocks will be driven and the width of the places splitting the blocks. The variation of block centers and width of the places under different mining conditions will permit maximum recovery with maximum safety.

AC Power

All the mining equipment at Ireland mine except for the haulage, is operated with AC instead of the conventional DC power. The underground power will be distributed at 6,900 V through "Mine Power Cable" insulated for 8,000 V. One of the three underground wires is insulated to form a circuit to insure continuity of ground wires throughout the entire system. In case of a ground circuit failure or a fault, the automatic breaker on the surface will disconnect all AC power in the mine. Air-cooled transformer units reduce the primary voltage to 440 V for use in the working areas. The 440 V power is distributed through Type C cable with ground conductors connected through relays and current-limiting resistors to the transformer neutral. This limits the voltage to ground and cuts off power to any circuit in which there is a fault. Distribution panels have ground-trip devices so that all electrical failures are confined to a single piece of equipment or cable. With this system when there is a trailing cable fault, there is no arc or burning that usually occurs on conventional DC cables. This distribution system is practically the same as the 4,160-V system that has been used successfully in stripping operations for the past 15 yr.

Main Haulage Design

The main haulage system has been designed to be as safe as possible. The roof and ribs will be wire meshed and gunited; the main haulage track will be 85-lb welded rail on treated ties ballasted and drained; adequate clearance will be maintained on both sides of the haulage road; the trolley and feed wires will be installed 6½ ft above the rail automatic electric switches, electric block signal system, and trolleyphones will be used for control. Ventilation throughout the mine will be provided from dual fans with automatic controls. Newly designed wet rock dusting units are used in the working face and are followed up with

the conventional high-pressure dry-type dusting machines.

Shaft Sinking

The three shafts at this operation were sunk using the method developed at Hanna Coal Co.'s Eastern Ohio mines. A ring of holes is drilled with a heavy-duty stripping drill around the perimeter of the shaft from the surface to below the coal. These holes are approximately 16 in apart and 8 in in diameter, and their primary purpose is to act as breakers. Seven holes are drilled to form a shooting pattern inside the rings of breaker holes, and these shot holes are then filled with sand. Approximately 10 ft of sand is blown out of each shot hole with an air line and each hole loaded with 25 lb of 60% gelatin. A round is fired and the rock loaded out of the shaft with a power shovel on the surface using a clamshell bucket. In this method of sinking the only time that men are in the shaft is to scale the ribs and to blow out and load the shot holes. This greatly reduces the man hours of exposure of men working in the shaft.

Two slopes were driven at this operation, 600 and 1,300 ft long. They were driven with mechanical equipment. Roof bolts were used to support both the roof and ribs in the slope driving. An exhaust fan was used and a curtain wall erected of corrugated sheet iron so that all the equipment was operated on intake air in the slopes.

In developing Ireland mine the most serious safety feature that has been encountered is the training of employees. The United States Bureau of Mines conducted their accident prevention course with a 100% participation which was very successful. We are at the present time starting classes in safety and mining at the mine that will be conducted by various members of the organization. First aid and mine rescue classes are planned in an effort to properly train employees and supervisors.

At Ireland mine we have received excellent cooperation from both the Local and District organization of the United Mine Workers of America, U. S. Bureau of Mines, and the West Virginia Department of Mines; and with this assistance, we hope to make Ireland mine the safest mine in the country.

FLOOD CITY

for the best

BRONZE PARTS

FLOOD CITY Bronze Parts are best . . . best fitting . . . best wearing . . . all expertly machined from the best grade of hard, wear-resistant bronze or to your particular specification bronze.

For years Flood City has furnished quality bronze parts at a savings in metal weight and machining costs to a variety of industries.

We welcome your inquiries concerning quotations and delivery on your bronze parts needs. Our reply will be prompt — and there is no obligation.



FLOOD CITY

BRASS & ELECTRIC CO.

JOHNSTOWN, PA.

PHONE: Johnstown 8-1281

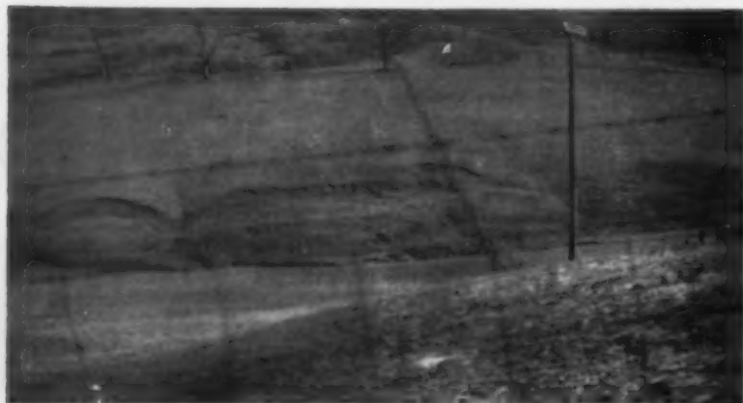


TYPICAL ROCK over coal seams in western Pennsylvania. When such rock caves into a mine void it does not break back. Rather it cantilevers and projects. Thus "draw" in the commonly accepted sense is impossible.

Rock character and the way it breaks up rule out the old "draw" theory. Surface action is the real cause of breaks back over the coal.



"DRAWS" even where no coal has been extracted. These slips caused by soaking of surface material with water are examples of conditions assumed to be draws.



The Facts About Draw

By **ALFRED W. HESSE**
Consulting Engineer,
Waynesburg, Pa.

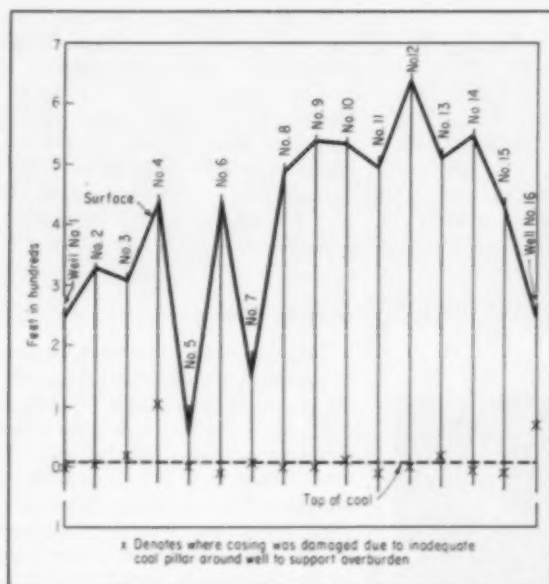
SUBSIDENCE OF OVERBURDEN as a result of the mining of bituminous coal does not create a "draw" from the level of the coal to the surface. This, of course, is contrary to long and widely held opinion, but nevertheless is the conclusion that must be reached in studying failure of oil and gas-well casings.

Draws may occur, but not, in my opinion, as they have been pictured in the past. By this I refer to the concept that overburden breaks slant back over the solid coal at angles of 8 to 15 deg—a concept that goes back a half century or more. But, to repeat, surface breaks do occur back over the solid coal. If not draw, what then is responsible? The evidence, in my opinion, clearly indicates that such breaks are a result of movement of the surface material and not breaks starting at the coal.

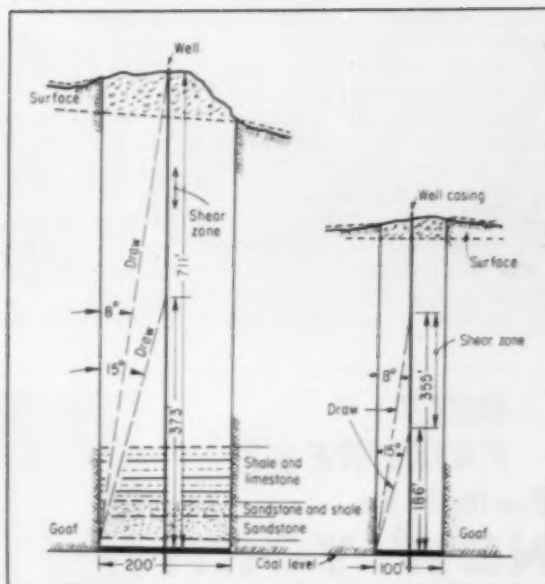
One reason for logical doubt of the traditional draw is the nature of the rock normally present over the coal. Even the shales are not tooth-pastes that can be squeezed out between the harder strata. Rock of this type does not slough off. As the falls extend up toward the surface and the weight of the overburden decreases, is it not more reasonable to expect that the upper strata of the rock will cantilever, rather than break back over the solid support?

How Rock Breaks Up

Also there is question of swell as the rock breaks up. Nobody disputes that the more completely the overburden is broken up as it falls the greater its volume. Consequently, when the coal is deep or thin or both, the breakup of the strata may increase the volume to the point where it supports the upper layers and the break does not reach the surface. Again, is it logical to believe that the material will break back over the solid coal? If this were so, the chamber formed



SIXTEEN WELL FAILURES—All resulting from inadequate pillars. If the "draw" principle applied, the failures should have occurred well above the locations where they actually did take place.



IF DRAW TOOK PLACE—sketches show how 8- to 15-deg draws would affect gas-well supports with coal pillars 100 and 200 ft in thickness if such draws actually occurred in line with past theory.

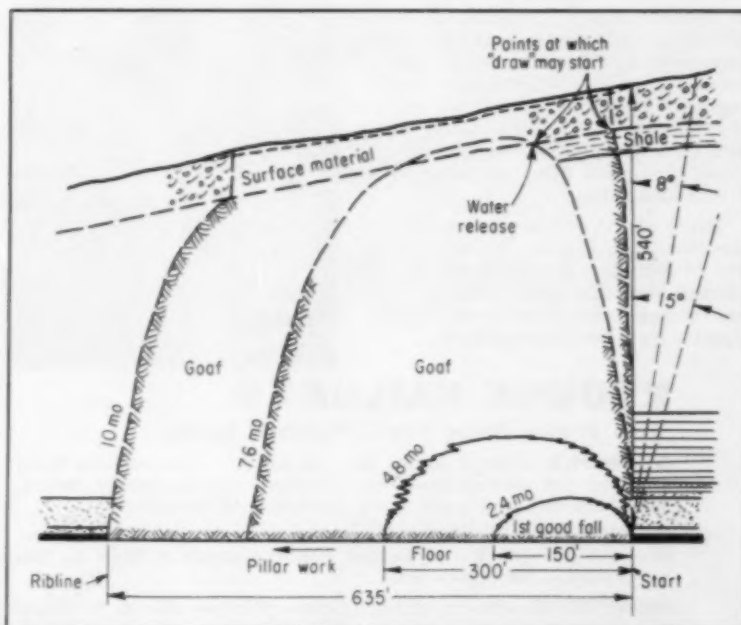
in the solid strata would extend over the solid coal in defiance of all rules of normal behavior of breaking beams or strata.

Places where coal thickness was so great that swell did not fill the voids and breaks consequently come to the surface provide an opportunity for checking. In Greene County, Pennsylvania, as an example, no true 8- to 15-deg draws, as evidenced by cracks in the surface, have come to my attention in 39 yr of mining in the county. True, there have been surface breaks back over the solid, but my observations indicate that they were the result of surface movement only and did not involve the rock strata at all.

How Well Casings Fail

Additional concrete evidence is found in the failure of gas and oilwell tubings and casings as a result of inadequate pillars. In a study of 75 gas wells it was found that in practically all instances the damage to the casing or tubing was in the coal horizon. The conclusion is that the failures were the result of movement of the column of overburden over the coal pillar.

This movement can be vertical or horizontal. If the coal pillar crushes, or a soft layer under the coal squeezes



WHAT REALLY HAPPENS in subsidence, based on action in Greene County, Pennsylvania. If draws of 8 or 15 deg were assumed, the rock would have to slough as indicated and fall into some available space. Here all that would be available is the triangular opening near coal level, which is manifestly too small. But, as indicated, slips may occur that may be mistaken for "draw."

into the void spaces, the casings will fail vertically. Evidence also has shown that the coal pillar and overlying overburden column may shift sideways because of pillar skids or

slips on underlying soft material. It is probable that a combination of these actions is involved in the failure of a well pillar, and that the casing failure reflects a combination of com-

pression and shear resulting from movement of the overlying strata.

Sixteen well-failure locations are shown in an accompanying chart, which also shows depths to the coal. All these failures were a result of inadequate pillars. In the case of No. 12 well, the earth subsidence was 18 in at the well, and when the hole was reamed out to reestablish a connection to the casing below coal level, the pillar was found to be crushed to fine coal and shifted. The tubing above the coal, as shown in the ac-

companying photograph, was not damaged.

With any of these wells, over 350 ft to the coal and with pillars not large enough to support the overburden, application of the 8- to 15-deg draw rule would have resulted in casing failure by shear in a zone between 186 and 355 ft. Or, if the well was protected by an adequate pillar, the principle of draw still should apply. Yet, to my knowledge, that has never happened.

What, then, does take place when

the zone of subsidence extends beyond the face of the workings? How can we account for surface breaks beyond the zone of subsidence in certain mined-out areas? It is the unusual, rather than the usual, when a noticeable draw appears on the surface, but when it does it usually is assumed that it started down at the coal bed. But if "Not so," is there any other reasonable explanation?

Pseudo Draws

Some examples of what appear to be draws are shown in the accompanying photographs. Actually, when these are studied it is found that the action is in the surface material only. In other words, it is the normal slip or landslide. The conclusion therefore is this: When the ground is opened, whether on a hillside or at the dome of the subsidence taking place over a mined-out area, the condition making draws similar to those in the pictures is established. There is no rule—of thumb or otherwise—to determine how far these draws will extend.

A conception of the sequence of subsidence in Greene County mines where modern and efficient methods are employed to remove all the coal is shown in an accompanying diagram. The overburden directly over the removed-coal area falls before any draw to the zone outside the workings can take place. To get 8- to 15-deg draws, therefore, the strata would have to tilt up and/or outward to find space for its bulk, which seems highly illogical for the strata in question.

The nature of the surface material where "draws" have been reported is of a nature that could slip or slide. It includes "unconsolidated material," as found in Northern Illinois; sand and gravel; and, as under a town near Pittsburgh, quicksand. Pillaring was being done in the area of the latter but too far away from the town for subsidence to be a factor. Yet streets, utilities and homes were damaged—but not two wells drilled through the same material.

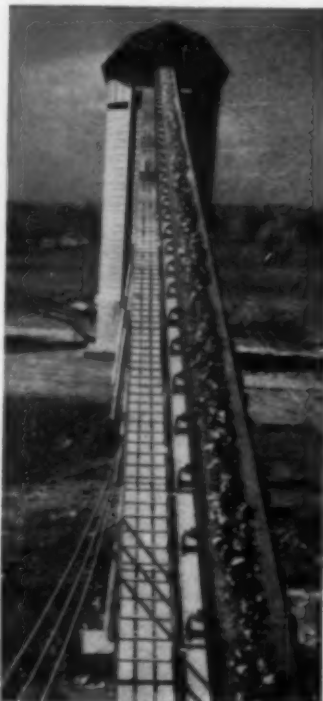
Surface materials of these general types, mobilized by water or released by the dome of subsidence, might—and no doubt does—shift or flow to voids left by falling rock in the subsidence zone, thus, rather than fracturing of the main overburden, resulting in draws.

Q. E. D.

BELT FAILURES? Switch to NEW YORK RUBBER!

New York Rubber, famous since 1851, manufactures belt designed to meet trouble—and overcome it! Built for the most severe service demands, there's a New York Rubber belt designed to solve your problem. Mineral mining, quarrying, coal mining—these activities often require a belt that will show superior resistance to sharp and abrasive materials, frequently in the presence of oil and grease conditions. Fire, too, takes its toll of conventional belts.

That's why it will pay you to investigate New York Rubber. A brief description of four of our most popular belts follows. Write on your letterhead for more complete details on these and other superior New York Rubber Belts.



REDUCE FAILURES

with these New York Rubber belts:

STONORE—Highest quality, for most severe service. Handles heavy ores, trap rock, crushed stone, coarse broken glass, slag, cement clinkers, direct feed from digging and mining machinery. Mildew-proof.

DEPENDABLE—For handling coal both under and above ground, sand and gravel, trap rock, sulphur, lime and limestone. Ideal for sub-zero temperatures. Mildew-proof.

NEOPRENE—Resists oil and grease conditions adverse to natural rubber. Handles caustics and coal briquettes. Heat-resistant to 250°F. Mildew-proof.

TEMP-PRENE—A neoprene compounded for fire resistance and severe, rough surfaces. Mildew-proof.

*Acceptance designation: "Fire Resistant, U.S.B.M. No. 28-11".



NEW YORK RUBBER

CORPORATION

Established 1851

100 PARK AVENUE • NEW YORK 17, NEW YORK

PLÁN

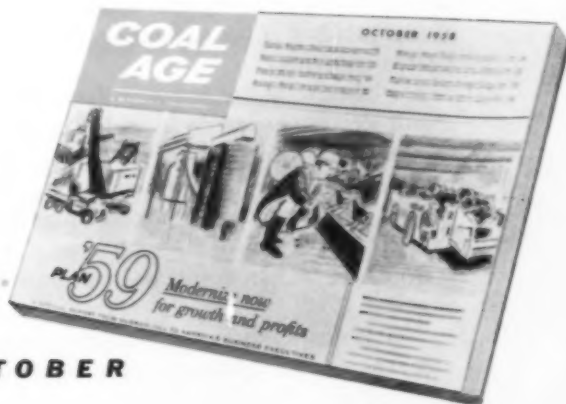
Modernize now
for growth and profits

**HOW TO
PREPARE
NOW
FOR THE
CHALLENGE
OF**

COAL'S TREMENDOUS FUTURE EXPANSION

**A SPECIAL REPORT FOR
ALL COAL OPERATING MEN.....**

COMING IN OCTOBER



PLAN 59

THIS IS THE CHALLENGE PROGRESSIVE

At this moment, the bituminous coal industry stands on the threshold of a tremendous expansion era.

By 1965, authorities predict, bituminous production will have grown to at least 710 million tons annually; by 1970 output will be around 900 million tons, over double the 430 million tons expected this year. And by 1975 we can look for an annual production of over 1 billion tons.

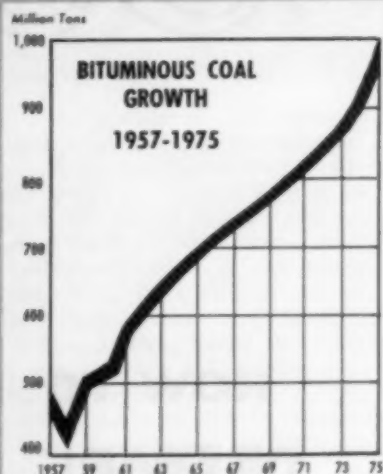
This bright outlook is realistic. It rests firmly on the Nation's anticipated economic development over the next 20 years—and coal's importance as the basic resource on which America's industrial might is dependent. Without abundant, low-cost coal, the U.S. industrial economy would soon grind to a stop.

Obviously, the United States is now entering a new period of economic growth as it leaves behind the recession of 1958. Numerous economic signposts, including a pick-up in coal production, point to the resumption this fall of continued economic progress, the normal way of life for the U.S. economy.

Why must our economy grow? For one thing, during the next 10 years American business must provide the goods and services required for a population that will increase by 32 million people. By just 1965, our gross national product may expand by \$160 billion if the economists have the future figured accurately.

The electric utility industry illustrates what a growing economy will do to coal. The utilities expect to boost their output 280% by 1975...with better than a three-fold increase in coal consumption. By 1975, utilities will be consuming some 560 million tons of coal...an *additional* demand of 400 million tons from just one customer between now and 1975!

Such is coal's future...a staggering opportunity...a tremendous challenge to progressive coal management to grow profitably.



PLAN 59

HOW MANAGEMENT

The challenge in the bituminous industry's future is a challenge to management—executive, operating and supervisory officials alike.

Increased demand is a challenge to each individual firm—a challenge for survival, for growth, for profitable operation, against intense competition, continually rising costs, and a complex business world.

No one firm will grow or profit automatically. For every company, a competitive per-ton cost, greater operating efficiency, high product quality, will continue to determine management's success.

Theme of COAL AGE's Special October Report is MODERNIZATION—How to modernize coal's productive facilities, its mines, plants, equipment and mining methods. How to plan for increased efficiency now, how to schedule operating improve-

COAL MANAGEMENT FACES IN THE '60s!

BITUMINOUS COAL CONSUMPTION 1957-1975 — MILLIONS OF TONS

	Actual 1957	1958	1959	1960	— ESTIMATED —			1970	1975
					1961	1962	1965		
Utility (including nuclear and aluminum plants energized by utilities)	157	157	182	194	220	245	290-320	370- 410	450- 560
Steel & Coke (including rolling mills, taconite and sintering plants)	113	92	116	120	125	130	130-150	140- 160	150- 170
Industrials (including cement plants and railroads)	106	94	105	112	121	130	150-190	180- 250	190- 300
Retail Deliveries	36	34	37	38	40	42	40- 50	40- 60	50- 70
Canada Exports	18	14	18	20	25	30	35- 45	45- 60	50- 70
Overseas Exports	57	39	52	55	58	60	65- 75	75- 90	80- 100
Total Consumption	487	430	510	539	589	637	710-830	850-1030	970-1270

Source: COAL AGE — KEYSTONE COAL BUYERS MANUAL ESTIMATE. Mine production normally totals within 5 million tons higher or lower than consumption, depending on changes in stockpiles. Ranges given for 1965, 1970 and 1975 reflect industry's varied growth prospects.

COAL AGE'S SPECIAL OCTOBER REPORT...

PLANS PROFITABLE GROWTH!

ments, how to prepare for additional capacity needed.

Essentially, COAL AGE's Modernization Study will be a report on management today... what far-sighted, successful companies are doing right now to prepare for profitable expansion... a series of actual case histories that will sharpen your own thinking, supplemented by check-chart guides to the areas where modernizing pays off best.

How to modernize for more output per man, for growth and profit during the next 10 years. That is the challenge to progressive management COAL AGE will analyze in its October issue.

A PRACTICAL WORKING TOOL FOR EVERY MINE OFFICIAL

Where are the opportunities, what can you do, how do you start... these are the key guides to

progress through modernization COAL AGE's October report will offer readers. Actual case histories plus working outlines in every significant phase of mine operation:

DEEP MINING — How to take an old mine and modernize it to compete at today's high operating rates.

STRIPPING — Adopting equipment and methods to get low cost, high efficiency.

PREPARATION — Modern cleaning methods, the answer to better customer satisfaction.

MINE SERVICES — New ideas, better equipment, key cost factors at today's productive mines.

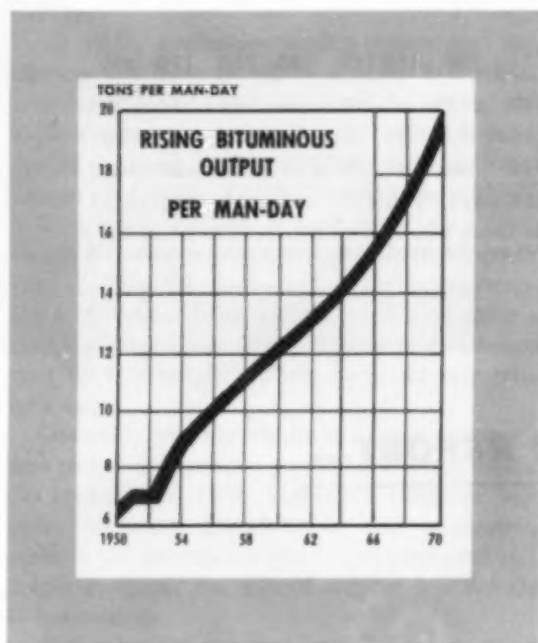
MANAGEMENT — Planning and action for better productive facilities, in management, engineering, supervision and training.

SAFETY — New concepts in safety education, more production for safer properties.



OCTOBER COAL AGE

PROGRESS IS COAL'S MOST POTENT WEAPON FOR THE FUTURE



Bituminous coal is one of the Nation's most progressive industries.

Since just 1950 it has pushed its industry-wide output from 6.77 to 10.73 tons per man-day—a boost of 58.5% that averages out more than triple the 2.5% annual efficiency gain reported for the country's manufacturing industries since 1951.

Yet the experts see another 40% spurt in the industry's efficiency in the next six years, to an average of 15 tons per man over-all by 1965.

Obviously, here's a test for every member of coal's operating management—executive, production, engineering, maintenance and safety officials.

The many companies already far above the average industry-wide man-day output must push even harder to keep their competitive lead—to mine profitably in the face of rising costs.

Every operating official, in his own area of activity, has a stake in the industry's future, a responsibility for progress through modernization of his company's productive facilities.

SINCE 1911...LEADING INFORMATION SOURCE FOR PROGRESSIVE MINE MANAGEMENT

OCTOBER'S THEME OF "PLAN 59" is but one special project among the continuing flow of mine reports, special studies, technical articles, economic analyses and monthly departments you'll find in COAL AGE every month.

COAL AGE is edited to serve the 21 basic job interests of progressive management officials. It is read, used and relied on regularly by more than 14,200 paid subscribers.

If you, too, are seeking progress, take a tip from the industry's top operating men...turn to COAL AGE every month.



A MCGRAW-HILL PUBLICATION • 330 WEST 42nd ST., NEW YORK 36, N. Y.

Subterranean Sam says:



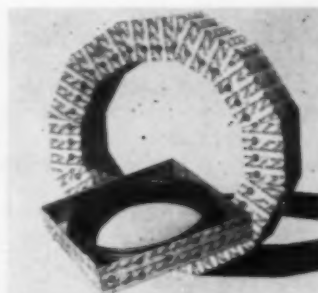
Sam is right. Once USS National Polyethylene Pipe is installed, you can forget about buying replacement pipe; you just won't need any. National Polyethylene Pipe, NSF Grade, offers excellent resistance to corrosive mine water, acids, alkalis, salts and other chemicals existing in coal mines. It's tough enough to resist cracking, even at sub-zero temperatures. It's flexible enough to perform over a working range from -90°F. to $+120^{\circ}\text{F.}$

Installation of USS National Polyethylene Pipe, NSF Grade, is simple and easy. You can carry a roll of this lightweight pipe on your shoulder. It unrolls like hose, turns corners, goes over and under obstructions, requires few joints.

Economical USS National Polyethylene Pipe, NSF Grade, is available in

sizes from $\frac{1}{4}$ " to 6" in diameter and in three schedules. For full details, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks



"The world's largest and most experienced manufacturer of tubular products"

**National Tube
Division of**



United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • United States Steel Export Company, New York



BREAKING HOISTING BOTTLENECK, new Princess Slope is concrete-lined and supported by steel arches. First cable belt in North America handles the hoisting. Conveyor length is 3,800 ft; peak capacity is 750 tph; total vertical lift is 693 ft; horsepower of drive is 550.

Three Years of Hoisting With the Princess Cable Belt

With 1 $\frac{1}{4}$ million tons already handled, cable belt in Princess colliery slope has operated with almost no difficulties. Substantial operating economies have been achieved in addition to lower first cost.

FIRST on the North American Continent, the cable belt at the Princess Colliery of Old Sydney Collieries, Ltd., Sydney Mines, Nova Scotia, has proved itself by handling nearly 1 $\frac{1}{4}$ million tons of coal in slightly over 2 $\frac{1}{2}$ yr of operation. Difficulties have been almost nil. None were the result of the basic design, and a trouble-free belt life of over 10 yr is expected.

The Princess cable belt went into service Dec. 5, 1955, to substitute for the previous shaft hoist and make possible an increase in the capacity of the operation, which was limited to around 1,000 tons per shift and 2,000 tons per day of two shifts. Since the existing shaft penetrated water-bearing measures and the pillars supporting it were small, it was decided to put down a new opening. A slope to the existing shaft bottom was indicated as

a result of a study of the various alternatives, including installation of a new shaft.

Slope sinking started Oct. 15, 1951, and was completed April 9, 1955. Installation of the conveyor, underground dump and other equipment was completed in November and actual hoisting, as previously noted, started Dec. 5.

Slope Specifications

Length of the slope is 3,445 ft. Inclination is 11 deg. Of arched construction, finished dimensions are: width, 18 ft; height, center, 13 ft. Support is provided by semicircular steel girders on 4-ft legs, all set in a concrete lining. The cable belt is placed on one side and the supply and man-riding track on the other.

Original planning for the installation was based on three conveyor units, each approximately 1,200 ft long. While the slope was being sunk, cable-belt installations in Great Britain, where the unit originally was developed, were studied by company engineers, and it was decided to go to a single cable belt.

Total length of the cable belt, supplied by Cable Belt, Ltd., Inverness, Scotland, is 3,800 ft between drive and return pulleys. Width is 42 in. The vertical lift is 693 ft. The drive is 550 hp and belt speed is 400 fpm, providing a rated peak capacity of 750 tph. Mine capacity is now a maximum of 5,000 tons per day of two shifts, compared to the earlier 2,000.

Cable-Belt Objectives

Major aims in the selection of the cable belt were:

1. Elimination of two underground drives and drive houses.
2. Elimination of two transport points.
3. Elimination of intermediate conveyor structure.

4. Reduction of coal degradation and dust. Although a cable belt drive is more expensive than one of the conventional type, the achievement of these aims showed a net saving in the cost of installation.

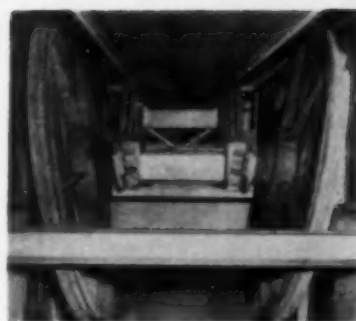
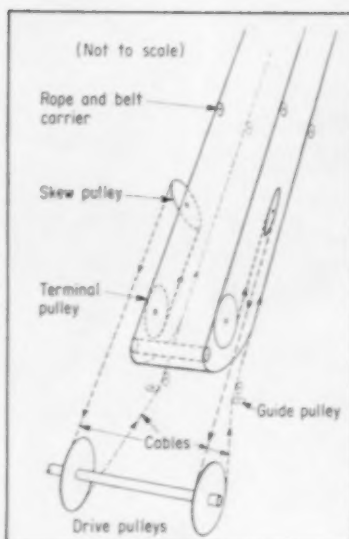
Length and lower cost are made possible by the special design of the cable belt. In this design, the tension members moving the belt along are separate wire ropes, one on each side. In the conventional belt, the carcass is the tension member, increasing both thickness and weight. By relieving the belt of the pulling job and limiting it to carrying only, it can be reduced to a single ply, with a saving in weight and cost materially in excess of the cost of the special supporting facilities. Incidentally, the elimination of idlers cuts the friction load to around half that of the conventional belt. A second saving is in the conveyor structure itself, since conveyor rolls are eliminated in favor of simpler rope carriers, or sheaves, fairly wide apart. Edge wear is eliminated, and the absence of idlers eliminates disturbance of the bed and spillage.

Cable-Belt Construction

Construction of the Princess cable belt is shown diagrammatically in an accompanying drawing. The belt is one ply doubled at the edges. The supporting members are transverse spring-steel rods $\frac{3}{16}$ in square on $3\frac{1}{2}$ -in centers, which have been modified in newer designs. A continuous groove is molded into each edge of the belt, as shown, into which the wire-rope pulling and carrying cables fit. In other words, the belt lies on and is moved along by the wire ropes on each side. No other attachments are required.

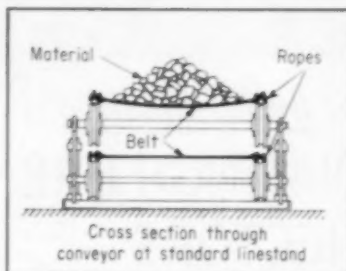
The wire-rope cables at Princess are $1\frac{1}{2}$ in in diameter, and are supported in grooved carrier pulleys. Pulley centers are 24 ft, except at places where the gradient changes, as at the slope entrance. Here, centers are shortened to 5 to 6 ft. On the return side, pulley centers are increased to 48 ft.

Wire cables and belt are endless, and the secret of the design is the method employed to separate and re-engage rope and belt at the feed and discharge ends. Two skewed pulleys are part of the answer. These are positioned immediately ahead of the conveyor terminal pulleys where the

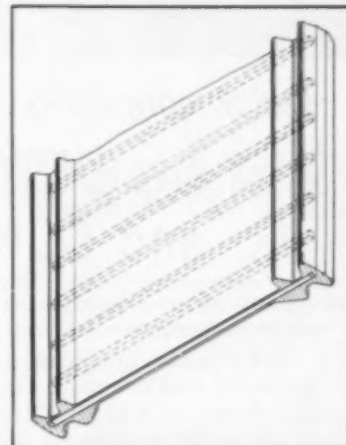


SKEW PULLEYS, shown in detail in photo at right, move the wire cables out as in the diagram, left, to separate belt and cables at drive and feed ends.

Cable-Belt Design and Operation



SHOE molded into each edge of belt rests on wire cables. Transverse steel rods (right view) support the single-ply belt and load. The cables are supported by carriers on each side. In this example, the stand is double to handle both loaded and return strands.



TOP-OF-SLOPE VIEW of belt shows rubber shoe on side of belt, rope carriers and control wire which extends the entire belt length.



Quick connection for better blasting...

AUSTIN DETONATING FUSE and CONNECTORS

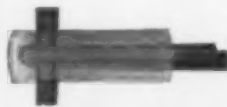
Effective blasting depends upon use of a powerful detonating fuse with proper connection between trunk and lead lines.

That explains why successful strip mines and quarries rely on Austin Detonating Fuse and plastic Connectors. This combination provides a quick hook-up of high strength fuse that won't slip, slide or lose contact in any weather or under any job condition. It also eliminates tying of knots and the resultant possibility of their becoming untied.

Blasting goes according to schedule with Austin Detonating Fuse, for it possesses more than enough power to initiate the entire charge in every hole. Protected with a waterproof covering, it is tough, but flexible . . . won't chip, peel or crack while being laid. It's insensitive to shock, abrasion and stray electrical currents.



First, thread fuse from shot hole through length of connector. Then, press the trunk line into the grooved slots.



Next, return the branch line through the end of the connector on the other side of the trunk line. Pull both ends of branch line tight for positive connection.



AUSTIN

POWDER COMPANY

CLEVELAND 13, OHIO

explosives ♦ permissible dynamites ♦ mine tools
♦ detonating fuse ♦ AP drill heads ♦ Akremite ♦ primers

actual separation of cable and belt takes place.

As shown in the accompanying illustrations and diagrams, the belt and cables arrive together at the head pulleys, at which point the ropes go around the pulleys while the belt continues forward a short additional distance to a snub pulley where the coal is discharged and the belt is turned for the return run.

Cable and belt are separated at this point and it is now necessary to spread the cables apart, take them on to the drive pulleys and return them to the bottom carriers in position to receive the belt on its return journey.

Spreading is accomplished by leading the cables back to the skew pulleys, the bottom grooves of which are exactly in line with the bottom grooves of the head pulleys. As the cable comes around and off the tops of the skew pulleys, it is out enough to clear the belt and is carried back to the drive pulleys, the grooves of which line up with the top grooves of the skew pulleys.

The cables go around the drive pulleys to the bottom and then are returned, with the assistance of guide pulleys, to carriers directly under the head pulleys, meeting the return belt at this point. Setting the drive pulleys back some 200 ft or so from the head pulleys at the end of the belt makes operation possible in spite of the necessary deflection angle.

A similar but reverse arrangement takes care of separation and re-engagement at the foot of the slope.

Cable-Belt Tonnage

Total coal handled by the Princess cable belt to the end of July, 1958, was 1,158,000 tons. The wire carrying cables were changed at about ½ million tons because wires were beginning to rust and break and it was felt that it was better to be on the safe side. Before changing, however, it was decided to try a lubricant that would not affect the belt. This lubricant was found to be satisfactory and was used on the new cables. For this and other reasons, the new cables are expected to handle considerably more coal.

A control cord the entire length permits stopping or starting the belt anywhere along. The belt receives coal from a reciprocating feeder under the rotary-dump hopper. Capacity of the dump is six cars per minute. The bottom, equipped with a dust-removal system, is operated by one man.



PAYHAULER FLEET

whips 17% grade with bonus loads

The Caldwell Engineers' five-unit 65 Payhauler® fleet highballs 2,500 cu yd of shot rock 1,000 feet daily up a haul road with 17% average grade. That's how this subcontractor keeps on schedule! His contract calls for excavating and crushing 165,000 tons of rock on the \$13,000,000 hydro and flood control Oliver Dam under construction at Columbus, Ga.

Making the 17% grade with bonus loads is routine for the Payhauler fleet on this newest of all dams being built by the Georgia Power Co. at Columbus.

"These are crooked haul roads," reports excavation foreman Dudley Rabb, "but our Payhauler fleet is whipping them to keep us on schedule. The rigs haul through axle-deep water 50% of the time...make pull-outs up roads that rise 170 feet in 1,000 feet...yet speed bonus loads to crusher and stockpile."

Prove the get-away surge, and up to 25% faster haul speed of an International Payhauler—the result of bonus turbo-charged diesel power; road-matched and load-matched gear choice; and the power-cushioning leverage of planetary drive axles.

See how a Payhauler shortens the cycle with pick-up truck spotting ease. Discover how exclusive high reverse, zip-around power steering, and grade-beating power boost your profits. Try split-second dumping with the double-acting hydraulic hoist. Measure the advantage of Payhauler operating ease, and downgrade safety of positive Torqmatic braking! See your International Equipment Distributor for a demonstration!



**International[®]
Construction
Equipment**

International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

From the heart of the nation's toughest



Slamming through hard shale and sandstone material, this TD-24 is constructing a highwall 30 feet deep and a 40-foot-wide bench for augering. On a virgin operation, the TD-24 faces up to 300 lineal feet of bench daily! "Planet Power steering enables the TD-24 to cut extra highwall yardage per day," states Supt. Ken Ellis, Ford Mining Company, Charleston, W. Va. "Live power on both tracks pulls out full blades on a continuous move."



"TD-24 Planet Power steering gives us the 'live' power on both tracks while turning to work tough, muddy terrain where other crawlers could produce practically nothing," states Claude Reed, operator for Haun and Waters, Robins, Tennessee. "The TD-24 gives maximum production, plus operating ease." The shovel, dragline, and TD-24 "team up" to enable the big crawler to move about 50% of the clay and shale overburden—to build haul roads and clean coal, too!



From the heart of the nation's toughest coal-stripping areas, owners report:

"Our Planet Power-steered TD-24's decisively outstrip other king-sized crawlers"



On this coal-stripping operation near Huntsville, Tennessee, TD-24's owned by Lloyd and Sherman Overton are shown teaming with power shovels to remove 50 feet of clay and shale overburden from coal seams 60 inches thick. "The live power on both tracks in turns enables TD-24's to move extra yardage, especially in the side-cut stripping operations," reports partner Lloyd Overton. That's a result of profit-boosting Planet Power steering!

◀ **Mullins and Mullins Coal Company**, Dorton, Kentucky, use exclusive International TD-24 Planet Power steering to doze rocky materials, and "round" the curves from highwall or bench with bonus blade loads. They reposition TD-24's doubly quick by using finger-tip controlled high reverse. "TD-24's make you money by doing more work than other makes, and giving high reverse speeds to get around faster and push more loads," states Fomso Mullins. The Mullins firm owns three TD-24's. They get a yardage bonus of up to 40%—teaming TD-24's as shown in inset!

Prove for yourself how Planet Power steering eliminates load-limiting "dead-track drag"—gives the TD-24 the same enormous capacity on turn or straightaway. See how you can "equalize" track speed to steer straight with heavy offset loads. Add up the extra "pushes" per day that exclusive, minute-saving TD-24 Hi-Lo shifting (forward and reverse) gives you! Ask your International Construction Equipment Distributor for a demonstration!



International[®] Construction Equipment

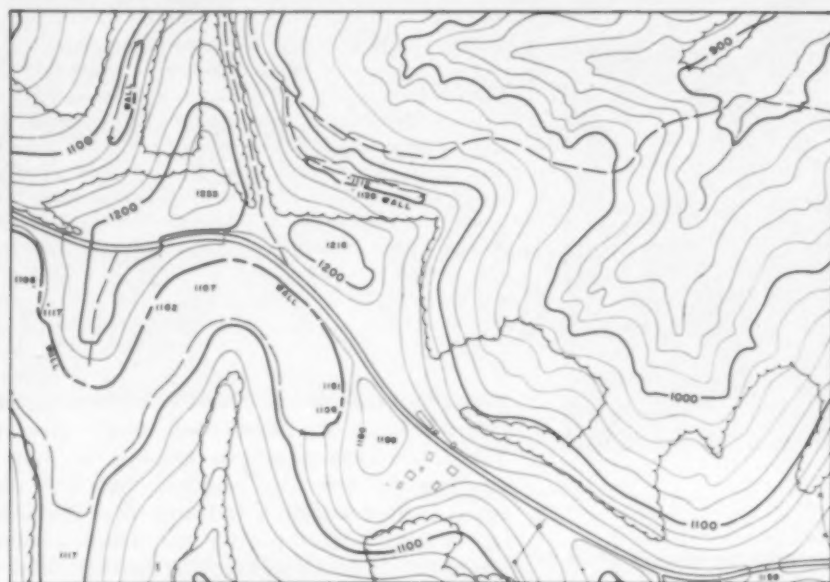
International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

How Hanna Uses Aerial Surveys



PROGRESS in a portion of Hanna's stripping operations is shown in this aerial photo, which is one half of a stereo pair. Highwalls appear in the upper half at the left.



MADE IN HALF THE TIME normally required, this map was produced from the photo above and its stereo mate, using a three-dimensional image projected on the mapping table. This image permits rapid determination of elevations and contours.



AERIAL "EYE" is pilot-photographer team with small plane flying predetermined lines above the area to be mapped.

How Hanna Uses Aerial Surveys

In addition to maps, Hanna stripping organization uses low-cost aerial photography as a basic tool in cost control.

FLYING a steady course over a predetermined area a small single-engined plane serves as the "eyes" of the Hanna Coal Co. in operating its stripping properties in eastern Ohio. The crew of the plane takes photographs that Hanna later uses in its land-evaluation program, in directing the operations of its stripping equipment, and in keeping a constant check on costs.

The pictures that result from this flying are the first step in the fast-growing profession of photogrammetry, an art of aerial mapping that Hanna and other coal operators are using increasingly to speed operations and cut costs. In fact, observes Thomas J. Henderson, head of Hanna's land purchasing department, aerial mapping has just about taken over all the company's mapping operations because of its accuracy, speed and low cost.

As an example, accurate topographic maps are needed to help complete negotiations for additional acreage. These maps are needed fast, but in one instance the time required for ordinary ground surveys would have been at least 6 mo. "We solved the problem," says Mr. Henderson, "by turning the job over to the American Air Surveys, of Pittsburgh. We had complete maps in less than 6 wk, almost one-fifth the time necessary for ground surveys. In situations like this, time is money, and the faster we have our maps the more we save."

Aerial-Surveying History

Hanna was one of the first in any industry to use aerial maps. In 1948 there were a few firms that took aerial photographs and claimed that they could produce accurate maps from them. Hanna decided to experiment and had an area of 16 sq mi flown and mapped. They had previously surveyed the same acreage by ground, and used these maps as a control check.

"Despite the rather simple equipment they had 10 yr ago, the maps were so accurate," notes Mr. Henderson,

"that we had no doubt that aerial mapping was the answer to many of our problems." Since that time, the use of aerial mapping has grown to the point where only minor surveys or deed-checking operations are done for Hanna by ground crews.

Government topographic maps, because of varying degrees of accuracy, were not reliable in giving the company a true picture of the land in question. Often the maps would show valleys where valleys didn't exist, or fail to show ridges that would be of value. Consequently, estimates of available coal frequently were much lower than the actual—or much higher. "Today, we have our own maps and they are accurate. If we want to, we can even look at the pictures through three-dimensional equipment and see for ourselves where the hills and the valleys are."

The three dimensional photographs are the raw material from which the topographic maps are made. In flying an area photographs are taken with an overlap of 55 to 60% so that the pairs of photographs can be studied stereoscopically. This is like looking through the old fashioned stereopticons, and gives a third dimensional view. On special equipment, this third dimensional view shows relief. Details that are sometimes passed up on the ground are easily observed. For the mining engineer, this means he can study geologic features, such as benching and outcropping, tracing them over a wide area in a few minutes time.

Cost Control

Hanna also is beginning to use aerial photography and maps for one of their most important operations: cost control. As Mr. Henderson explains it: "All our costs are determined by the number of yards of overburden and tons of coal removed. This ratio of cubic yards of overburden to tons of coal is one of our most important statistics, for it enables us to determine the costs of blasting, stripping, haulage and so on."

For such figures to be of value,

they must be up to date, which means that the exact yardage moved must be determined each month. For some years Hanna sent crews out into the field to produce planimetric maps that would show the distance the shovel traveled, and from this determine yardage and tons produced. Because of the slowness of the operation, the crews had to be sent out early; also they had to do some educated guessing for the days they would be back in the office.

Now, the plane takes off the last day of the month and within an hour or two takes all the necessary photographs needed for the estimates. Producing the maps takes two or three days, but before a week has gone by, Hanna has an up-to-date map and figures of the previous month's operation that help keep costs in line as well as help forecast costs in new areas of development.

Solving Problems

While Hanna makes primary use of its aerial maps for land evaluation, purchasing and cost-control, it has found that with such maps conveniently at hand they are solving problems that previously required sending men into the field. The savings in time, aside from the costs of field crews, is quite substantial. The maps have proved especially valuable in laying out access roads, service and communication lines, plotting boreholes, and estimating not only coal acreages but quantities and volumes of timber acreages.

"Costs for aerial surveying and mapping vary considerably from job to job," Mr. Henderson notes. "But on the average, we have found that not only do we get maps in one-half to one-fifth the time needed for ground surveys, it costs us about half as much. As for accuracy, we have found them to be as accurate, if not more accurate in some cases, than ground surveys." This results from the fact that the accuracy of aerial maps meets civil engineering requirements; that standard specifications provide that 90% of all elevations shall be accurate within one-half contour interval; and that no part of the map shall be in error more than one contour interval.



New Concentrating Plant near Hibbing, Minnesota

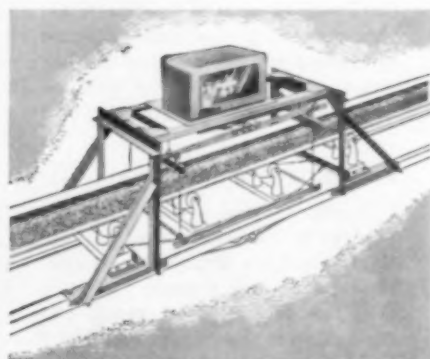
8

ABC's Scales mean increased concentrate production

ABCs Belt Conveyor Scales have substantially increased concentrate production at this new washing, heavy media, spiral and cyclone plant. Efficiency demands accurate continuous weighing of:

1. incoming crude ore
2. heavy media feed
3. heavy media concentrate
4. cyclone feed
5. spiral concentrate
6. washed fine concentrate
7. total fines concentrate
8. washed ore and coarse concentrate

For more information on how ABCs Scales can improve *your* production efficiency, contact your local representative or write for Bulletin 100A.

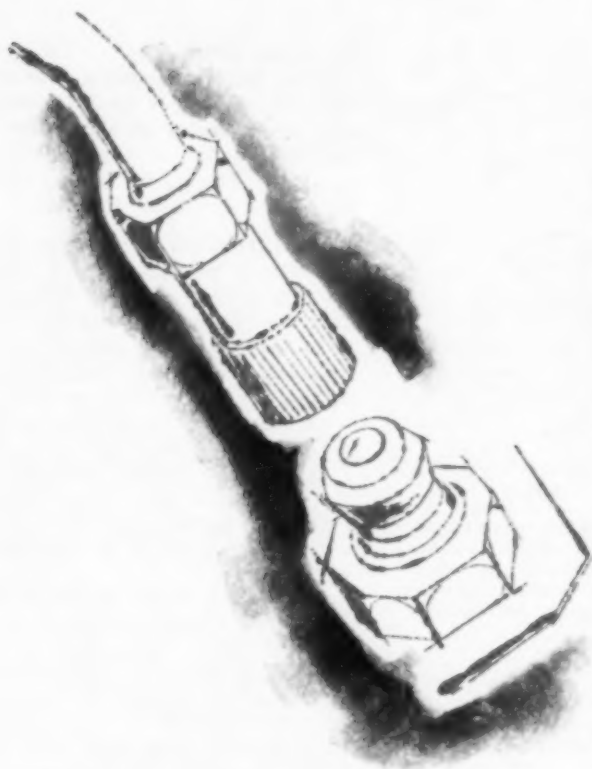


ABC

BELT SCALES AND FEEDERS



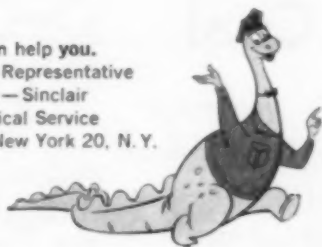
ABC Scale Division • McDowell Company, Inc. • 16330 Waterloo Road • Cleveland, Ohio



Machinery... lubrication... and how to save money

Sinclair Litholine® multi-purpose grease gives many important advantages over ordinary industrial lubricants. For example, it eliminates the need for a variety of single-use greases. Furthermore, it has earned a reputation for water resistance and high temperature performance. Change to Litholine, now. And when management asks how you've cut costs, tell them you've switched to Sinclair—and show them the results.

Find out how Litholine can help you. Call your nearest Sinclair Representative or write for free literature—Sinclair Refining Company, Technical Service Division, 600 Fifth Ave., New York 20, N. Y. There's no obligation.



SINCLAIR

Litholine®

Multi-Purpose Grease

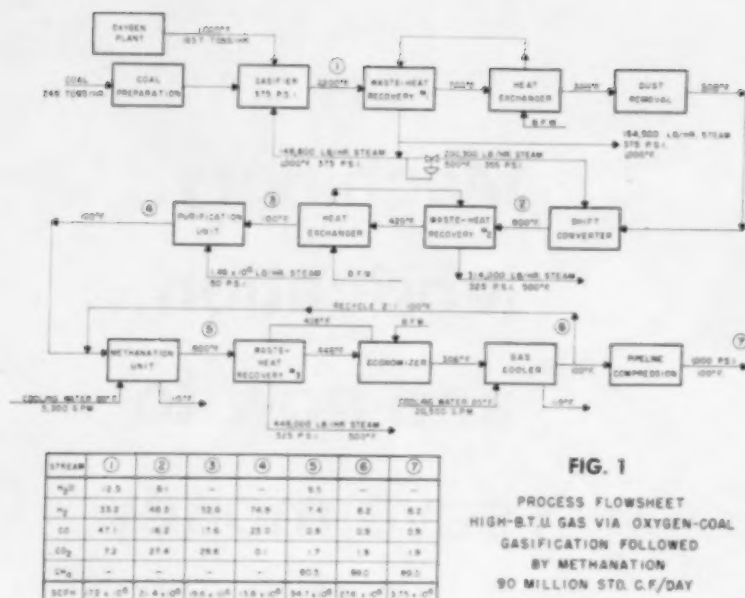


FIG. 1

PROCESS FLOWSHEET
HIGH-B.T.U. GAS VIA OXYGEN-COAL
GASIFICATION FOLLOWED
BY METHANATION
90 MILLION STD. C.F./DAY

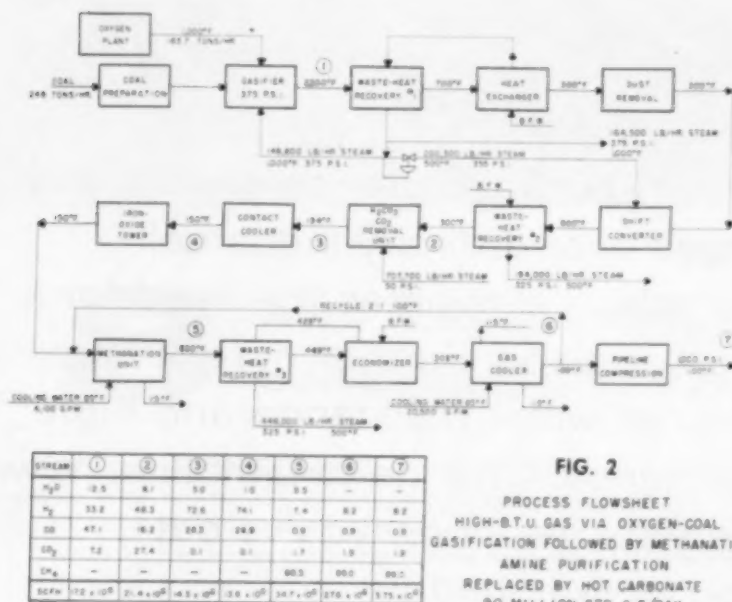


FIG. 2

PROCESS FLOWSHEET
HIGH-B.T.U. GAS VIA OXYGEN-COAL
GASIFICATION FOLLOWED BY METHANATION
AMINE PURIFICATION
REPLACED BY HOT CARBONATE
90 MILLION STD. C.F./DAY

By Sidney Katell

Chief, Process Economics Evaluation Staff, Branch of Coal Gasification, U. S. Bureau of Mines, Morgantown, W. Va.

BOTH INDUSTRY and Government agencies are expending considerable effort to develop economic methods of producing a synthetic high-Btu gas from solid, liquid or gaseous raw materials. The processes under investigation are many. Some are short-term; others long. All have their merits. All seek the same goal.

Coal is well qualified for conversion to pipeline gas. It is readily available in ample supply and is relatively cheaper than any of the other raw materials.

A discussion of the timeliness of the various research projects is beyond the scope of this paper, since there are numerous forecasters whose predictions are available for evaluation. The contrasts run from anticipated shortages in the 1970-1980 era to the present-day note that gas reserves are increasing.

Bureau of Mines interest in processes for producing synthetic pipeline gas as a natural outgrowth of the synthetic fuels program. There is much similarity in the initial unit operations for converting coal to synthetic liquid products and converting it to a synthetic gas.

A cost study of any process to convert coal to a substitute natural gas must be considered preliminary, since the process and operating data for many conversion steps either are not yet available or require additional laboratory or pilot plant development.

This paper will be concerned with several cost studies that have been completed. These studies are being prepared primarily to serve as research tools and, as such, should prove their value in guiding the research programs presently under way. The information made available is as factual as the present technology permits. Revision in the cost data will be in order as soon as any of the required additional data are procured.

Flowsheet The First Step

The first step in developing a cost study is preparation of a flowsheet,

The Economic Outlook for Pipeline Gas From Coal

What the prospects are for four possible processes, including two using nuclear heat. With \$4 coal, plant theoretically possible where demand would exceed 90 million cu ft per day and sales could be made at over \$1 per MCF.

and the first criterion is the size of the plant. For our studies we have selected a unit able to produce 90 million standard cu ft per day of high-Btu (900+) gas. Fig. 1 is a flowsheet in which coal, steam and oxygen react to produce a synthesis gas. The raw gas, after dust removal, is shifted, purified with D.E.A. and iron oxide, and then upgraded (methanation) to produce a 930-Btu gas. At the time of preparation, this particular study was established as the base with which to compare subsequent studies.

The next flowsheet (Fig. 2) differs from the first in respect to the purification scheme. Hot-carbonate scrubbing, developed by the Bureau of Mines, at Bruceton, Pa., is utilized in place of the D.E.A. previously mentioned.

The bureau, in cooperation with the Atomic Energy Commission, had initiated an investigation dealing with the application of nuclear energy as a source of process heat. Various approaches to the problem were outlined in an article by Strimbeck, McGee and Katell, "Atomic Energy in the Gas Industry," published in the October, 1956, issue of the *American Gas Association Monthly*.

One potential nuclear application is in synthetic-pipeline-gas production. Fig. 3 is a conceptual design in which the heat required for the steam-carbon reaction is provided by a nuclear heater. The oxygen plant is eliminated and the coal requirements are considerably reduced compared to the two systems previously summarized.

One other concept that is even more theoretical is shown in Fig. 4. It visualizes the reaction of steam, hydrogen and coal, with nuclear heat, to produce a gas containing approximately 45% hydrogen and 23% methane. After dust removal the gas is shifted, purified and enters a separation unit where the hydrogen required for the initial gasification step is removed from the product stream. Separation may be accomplished by any one of three methods: adsorption, absorption or low-temperature liquefaction.

Cost Estimates

Recognizing that the validity of several of the process variables will require laboratory verification (for example, the kinetics of the steam-

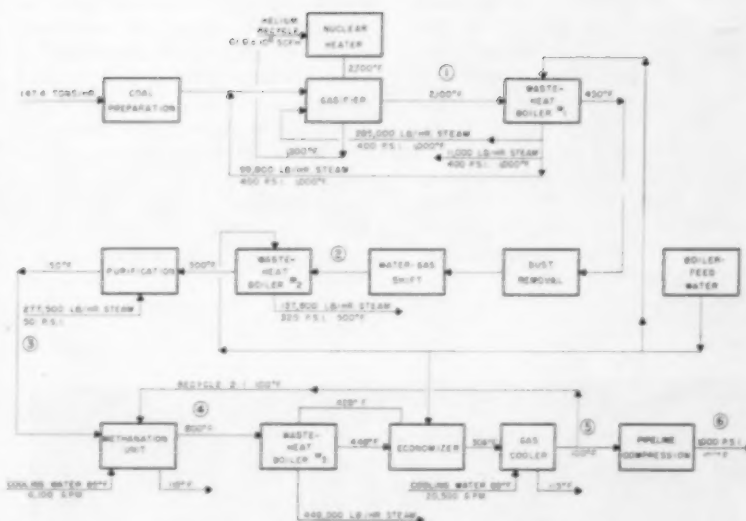


FIG. 3

PROCESS FLOWSHEET
HIGH-BTU GAS VIA STEAM-COAL
GASIFICATION UTILIZING
NUCLEAR HEAT
90 MILLION STD. C.F./DAY

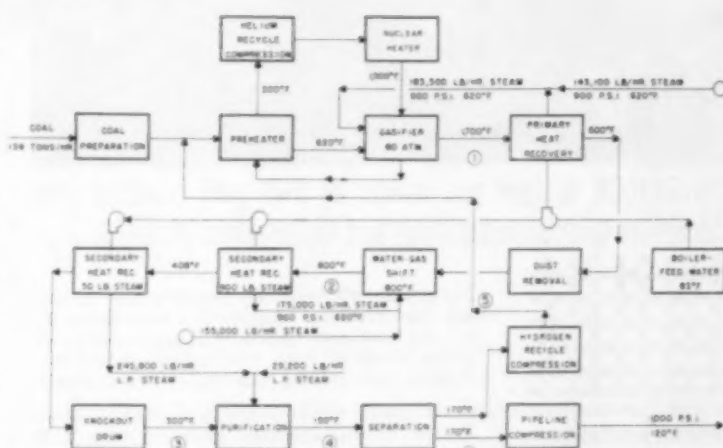


FIG. 4

PROCESS FLOWSHEET
HI-BTU GAS PLANT
STEAM-HYDROGEN GASIFICATION OF COAL
FOLLOWED BY SHIFT AND SEPARATION
60 ATM, 1700°F.
90 x 10⁶ STD. C.F./DAY

Capital Costs for 90-Million CFD Synthetic Pipeline Gas Plants

	Total	Dollars per Daily MCF
1. Oxygen-coal gasification (D.E.A. purification).....	\$95,000,000	\$1,055
2. Oxygen-coal gasification (hot-carbonate purification).....	84,000,000	900
3. Steam-coal gasification (nuclear heat).....	72,000,000	800
4. Steam-hydrogen-coal gasification (nuclear heat).....	80,000,000	890

hydrogen-coal reaction is an unknown factor under the conditions we visualize) we have developed cost analyses of the foregoing modes of producing a synthetic pipeline gas from coal.

The estimated capital requirements, which include initial catalyst and chemical costs, interest during construction, and working capital are as shown in the accompanying table (on the preceding page).

We are obviously dealing with

base-load-plant installations, since the one item of return on investment alone, at 12%, equals \$8,640,000 in Case 3 which, in turn, is equivalent to \$0.29 per MCF, assuming operation for 330 days at full load.

With a 330-day operating year, coal at \$4 per ton, labor at \$2.25 per hour, and payroll overhead at 18.5% of payroll; the cost of engineering, laboratory, accounting and other items of expense which cannot be directly charged to the op-

erating units charged at 50% of labor, maintenance and supplies; property taxes and insurance at 2% of investment; and depreciation at a normal depreciation rate of 5%, the estimated operating cost has been calculated to amount to:

	Per MCF Before Return on Investment	Per MCF With 12 Percent Gross Return*
1.....	\$0.75	\$1.13
2.....	0.70	1.04
3.....	0.60	0.89
4.....	0.52	0.84

*Gross return is defined as return on investment before income tax.

One of the assumptions made for these studies is that the plant is adjacent to the mine site, and that the average cost of the run-of-mine coal is \$4 per ton. With a deviation of \$1 per ton for the coal price, the cost of gas will vary \$0.08 per MCF for the first two examples and \$0.04 per MCF for the remaining two.

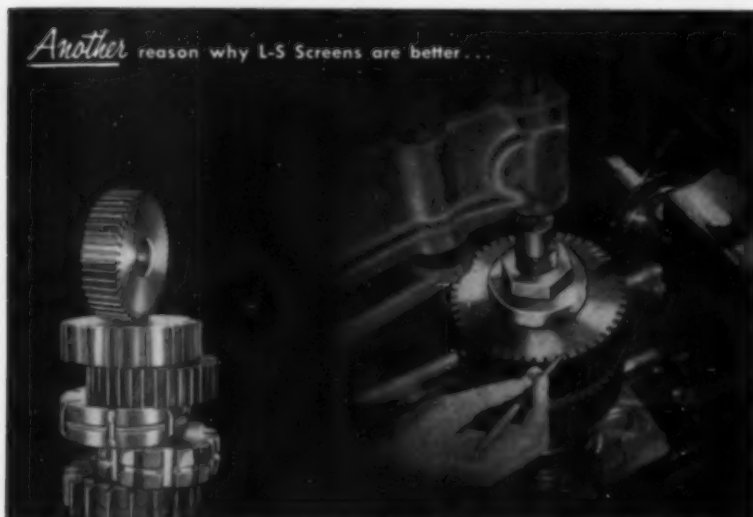
Gasification Possibilities

Several conclusions can be established on the basis of the information presented and on the status of the various research programs contemplated or in progress.

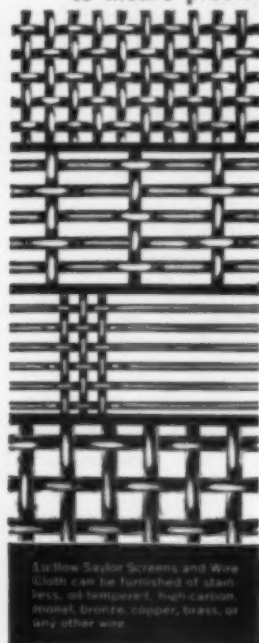
From the estimates and published data from the Institute of Gas Technology and other sources it may be stated that there are now available coal gasification processes (oxygen-steam-coal) which could be put to use if there were an area where sufficient sales for gas at over \$1 per MCF would warrant the construction of a 90-million standard cu ft per day plant. Breaking the "dollar barrier" would entail considerably more of both basic and applied research and would probably require a concerted effort on the part of all interested parties. We must not lose sight of the fact that a plant of the size under investigation would take approximately 2 yr to build, preceded by a 2- to 3-yr period for preparation of engineering design and equipment specifications.

There are several other processes being considered for the conversion of coal to a synthetic pipeline gas, and the economics of the following will eventually be included in the series of cost studies:

1. Lurgi gasification.
2. Coal hydrogenation.
3. Steam-iron process.



LUDLOW-SAYLOR designs and makes its own wire crimping dies to insure precision weaving and dimensional stability



No guesswork here! To produce L-S crimping dies requires engineering knowledge of all physical and chemical characteristics of many kinds of wire, production know-how, skillful tool making plus critical supervision.

Such careful methods are typical of Ludlow-Saylor manufacturing. That is why L-S Super-Loy Screens are tougher and stronger, more rigid and accurate. They wear longer, stand up better under every operation condition—yet cost no more than ordinary screens.

Immediate Shipment of most weaves and sizes

Write for Condensed Screen Reference Catalog

Ludlow-Saylor

WIRE CLOTH COMPANY

609 S. Newstead Ave. • St. Louis 10, Mo.



SALES OFFICES: Birmingham, 1727-4th Ave. N.; Chicago, 5708 W. Diversary; Pittsburgh, Union Trust Bldg.; Houston, 1213 Capitol Ave.; Denver, 1530 Carr St. WEST COAST SUBSIDIARY, Los Angeles, Star Wire Screen and Iron Works, Inc., 2515 San Fernando Blvd.

Ludlow-Saylor Screens and Wire Cloth can be furnished of stainless, oil-tempered, high-carbon, malleable, bronze, copper, brass, or any other wire.



Geared by FULLER... ...ROADRANGERS® help move 86 tons

Efficiency, speed and maximum payload are emphasized in the Peabody Coal Company's operation of the River King coal mine near Freeburg, Illinois.

Single-stick, 9-speed Fuller R-1150 ROADRANGER Transmissions are a feature of the Cummins Diesel-powered Euclid tractors used by Peabody to pull loads from the strip mine to the preparation plant five miles away. Euclid trailers of 72 cubic yard heaped capacity are loaded to an average payload of 55 tons, and gross vehicle weights run to almost 86 tons.

Peabody stresses mobility, keeping truck speeds as high as possible, pro-

viding in-motion dumping at the preparation plant, and minimizing the necessity for stopping and reversing. The Fuller R-1150 ROADRANGER Transmissions used at the River King Mine are built specifically for heavy-duty, off-highway operation. Peabody officials are highly satisfied with the performance of the ROADRANGERS used in their operation.

Fuller R-1150 ROADRANGER Transmissions offer these important advantages:

- No gear splitting — 9 selective ratios are evenly and progressively spaced.
- Easier, quicker shifts—38% steps

between ratios.

- One shift lever controls all 9 forward and 1 reverse speeds.
- Engines operate in peak hp range with greater fuel economy.
- Less operator fatigue — 1/3 less shifting.
- Range shifts pre-selected — automatic and synchronized.



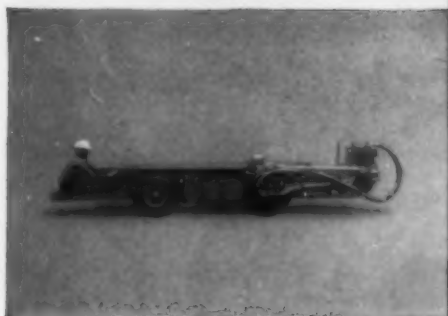
FULLER MANUFACTURING CO. Transmission Division • Kalamazoo, Mich.
Subsidiary, Calumet Manufacturing Company

Unit Drop Forge Div., Milwaukee 1, Wis. • Shaler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 4, Cal. and Southwest Dist. Office, Tulsa 3, Okla.

FOR STATIONARY AIR COMPRESSOR USERS...

THE ACME JUMBOLTER

Model
HSJ



FASTER AND EASIER!

Time studies have proven that under most mine conditions the ACME JUMBOLTER installs roof bolts 3 times faster than hand held machines.



LET THE MACHINE DO IT!

The ACME JUMBOLTER takes the heavy lifting and hauling out of roof bolting. Finger tip control positions the stopper at any desired point. Two stoppers will cover any point in a space 23' 10" wide without moving the JUMBOLTER. Arms reach 9' in front of the machine and swing 270°. No blocking is required for uneven top. Ample space provided to carry the day's supplies.

* The ACME JUMBOLTER was designed to furnish a quick and easy method of drilling Roof Bolt holes where a mine is equipped with stationary or semi-stationary air compressors and having air piped to the working face. The unit is self propelled with full hydraulic drive and hydraulic steering. It is equipped with two Stopper Jumbo Arms and is complete with

Stoppers and Dust Collectors. Cleveland Model S12V Straight or Telescoping Leg Stoppers or Model S20 Stoppers may be used. All equipment is Bureau of Mines Approved. Best operating Conditions in seams 42" to 108" high.

We will demonstrate in YOUR mine. For more detailed information write or call —



ACME MACHINERY COMPANY

WILLIAMSON, WEST VIRGINIA

WAREHOUSE AND SALES OFFICE • REPRESENTATIVES IN PRINCIPAL MINING AREAS
MORGANTOWN, W. VA.



This Barber-Greene underground mine conveyor is operating in the heart of West Virginia's bituminous field. Send for 192-page catalog describing the full Barber-Greene standardized conveyor line.

Lengthen easily — a cost-cutting advantage of Barber-Greene conveyors

Now 2000 feet long from face to portal, this Barber-Greene conveyor has already been extended several times. And it will be lengthened many more times before the deposit is worked out. The easy lengthening of Barber-Greene underground mine conveyors is just one of the many advantages of Barber-Greene standardization.

These advantages are:

Faster delivery. Packaged units come from dealer stock or are immediately available from the factory.

Low-cost erection. Conveyors get into operation sooner, with big savings in engineering costs.

Unmatched flexibility. Interchangeable parts simplify lengthening or shortening of conveyors to meet changing needs.

Parts availability. Repair parts can be shipped from stock—usually from the local distributor's stock.



Literature on request.

SB-2-PEU

Barber-Greene

AURORA, ILLINOIS, U.S.A.



CONVEYORS...LOADERS...DITCHERS...ASPHALT PAVING EQUIPMENT



This easy handling Travel-Crew Cab model carries six men in all-weather comfort to the job site. It's rated up to 25,500 lbs. GVW. Plenty of leg room fore and aft. Seats measure over five feet wide. Third door means easier access to rear. Cab and chassis are warranted *work-ready* . . . for one, low complete unit price. Six-cylinder engine economy in compact-design or conventional models. Tandem-axle models to 33,000 lbs. GVW.



Bonus loadspace pickup bodies up to 8½ feet long "hotshot" all-purpose loads. Floor and side-walls of all-steel construction add unit tightness and longer life. Three men ride in comfort—seat is over five feet wide. More forward vision with the biggest distortion-free windshield in its class. Add to this an economical "six," more usable horsepower, high torque at low rpm.—and, component for component, you'll get a better buy!



INTERNATIONAL TRUCKS

Money-saving ways to move loads...men...materials!

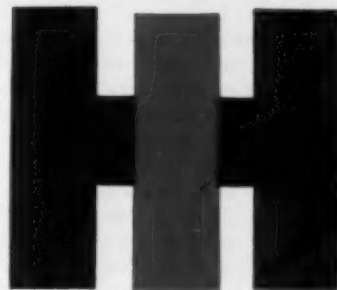
Rugged INTERNATIONAL diesel trucks
engineered by truck specialists for extra-heavy-duty work.

INTERNATIONAL Travel-Crew Cab trucks
that haul six-man crews and full-sized loads.

Bonus-load INTERNATIONAL pickup trucks
that give you more "go" with traditional six-cylinder engine economy.

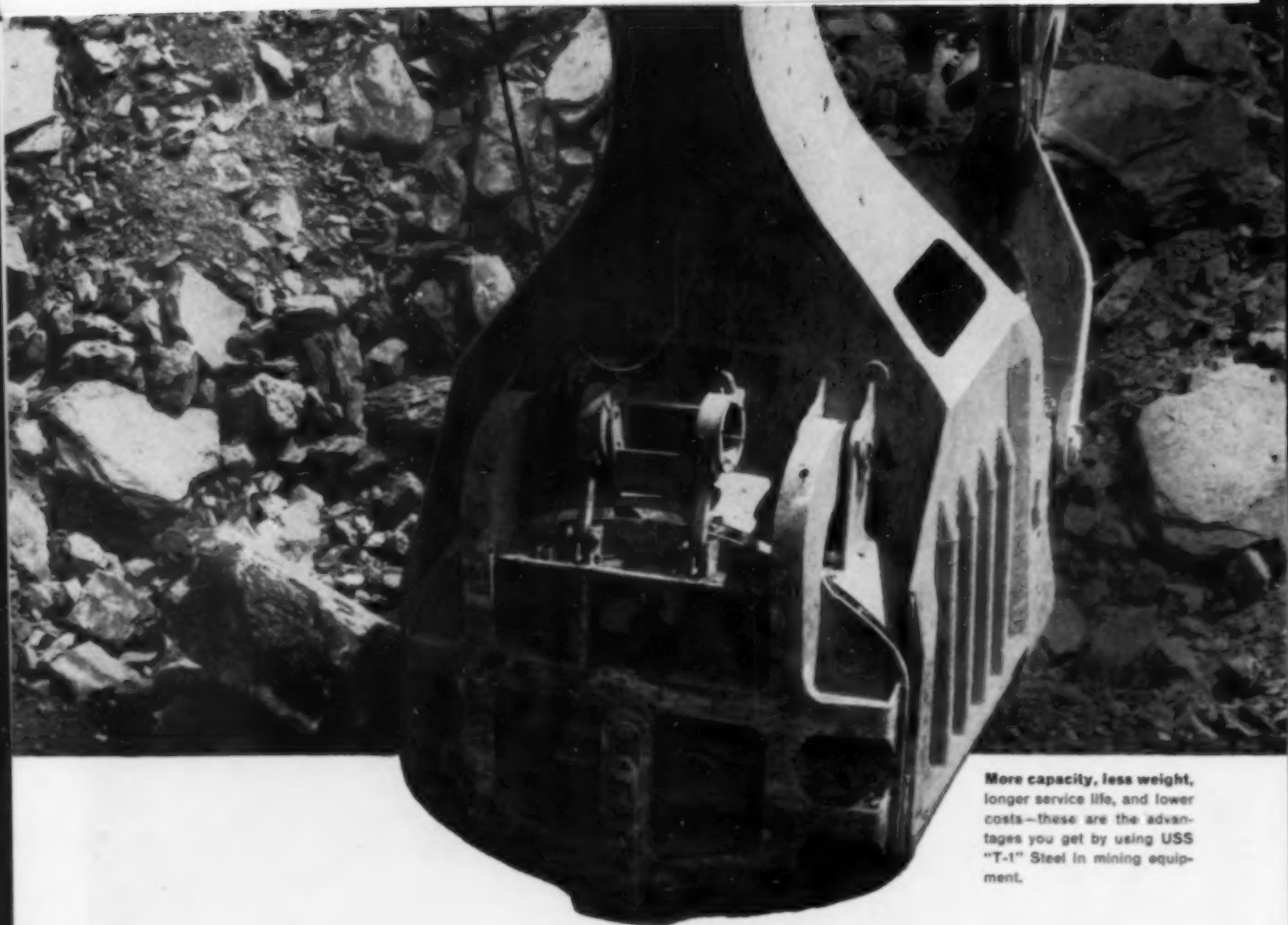


Where punishment is measured by the ton, you'll find an INTERNATIONAL Truck like this model RDF-230-H taking more than its share! Extra-rugged front end construction readily absorbs day-after-day wear and tear. An HR-6-B Cummins 175 hp. high torque diesel engine teams up with job engineered drive lines and extra-heavy-duty axles for dependable power at the wheels where it counts. *Important!* Truck ratings are backed up by work-proven components—range to 60,000 lbs. GVW. See your INTERNATIONAL Truck Dealer!




INTERNATIONAL HARVESTER COMPANY, CHICAGO
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick®
Farm Equipment and Farmall® Tractors

cost least to own!



More capacity, less weight, longer service life, and lower costs—these are the advantages you get by using USS "T-1" Steel in mining equipment.

Dippers that ram through rock

built stronger, tougher and lighter with  "T-1" Steel

Did you ever cling to the "crow's nest" of one of the new giant shovels and feel it ram into a wall of rock and shale? The big machine shudders, then braces its feet and digs in with all its tremendous mechanical muscle. The dipper becomes a real battering ram—and you wonder how any steel can stand such punishment, day after day.

United States Steel engineers and metallurgists asked the same question, and developed a special steel, USS "T-1" brand. This steel can take terrific shock and impact abrasion. It's extremely tough—even at 50° below zero. And it is now available with more than three times the yield strength of structural carbon steel—100,000 psi minimum.

This great strength permitted a weight saving of 40 tons in one large shovel where "T-1" Steel

was used in the dipper, dipper stick, bail and crowd rack. In spite of the high strength, shovel manufacturers had no difficulty welding, forming and machining this quenched and tempered alloy steel.

USS "T-1" Steel can help you. Consider it where you need a steel with great strength, extraordinary toughness, or resistance to impact abrasion combined with ease of fabrication. Write for our book *USS "T-1" Steel*. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

Immediate Delivery. USS "T-1" Steel products are now immediately available in minimum mill quantities. Reason: our new continuous heat-treating line is now in full operation. It assures better delivery as well as top quality.

USS and "T-1" are registered trademarks

United States Steel Corporation—Pittsburgh
Columbia-Benava Steel—San Francisco
Tennessee Coal & Iron—Fairfield, Alabama
United States Steel Supply—Steel Service Centers
United States Steel Export Company



United States Steel

"POWERSTEEL"

WIRE ROPE PAYS OFF

Longer Life
Higher Production



NEW! YELLOW STRAND WIRE ROPE CLIPS...

Ask for them at your Yellow Strand Wire Rope Distributor. Heavy-duty galvanized steel U-bolt. Drop-forged steel saddle, hot dip galvanized. Easily applied.



How much longer life? Owners report that Yellow Strand "Powersteel" averages 25% longer service life, and ranges much higher on many applications.

How much more production? You'll require fewer rope changes on your equipment with "Powersteel," handle bigger loads, operate larger machines. You'll get greater production and more profit... less "downtime" and lower operating costs!

"Powersteel" is an extra high-strength rope for heavy loads and abrasive conditions. It spools freely, resists wear and crushing, and was developed for your high speed, high production equipment.

Your nearby Broderick & Bascom Distributor stocks an ample supply of Yellow Strand "Powersteel." See him for complete details. Broderick & Bascom Rope Co., 4203 Union Boulevard, St. Louis 15, Mo.

Yellow Strand

Quality WIRE ROPE since 1876

Foremen's Forum



Reading for Profit

Reading for profit consists of getting useful ideas out of the printed matter before your eyes, then putting these ideas to work. Here are some helpful tips on reading.

YOUR JOB-RELATED READING can be a boring chore if you merely plod through the printed words. On the other hand, such reading, if it is done well, can result in marked improvement in your job performance. Reading is like most other things we do—we become more proficient if we approach the activity with a plan of action and if we remember that practice improves the skill.

The benefits result from getting more out of what we read, not from reading our business literature faster. It comes down to a matter of intelligently selecting the material that should be read, then reading it deeply to achieve full comprehension.

You might think of it as a process of "two-level" reading. At the top level the eye scans the words to register their meanings. At a deeper level the brain

thinks about allied experiences the reader has had, and the matter on the printed page now becomes assimilated in the reader's own experience. This is the kind of reading one remembers. Reading only at the top level can be entertaining, but job-related reading should go deeper than that.

In an article in a recent issue of *Manage Magazine*, Lester F. Zerfoss, staff advisor for executive development at American Enka Corp., lists five guiding principles for developing better reading skill, as follows:

1. We must realize that when we read for a specific purpose our reading is more productive. This assumes that we have spelled out in advance of the reading just what it is we expect to get from the article. This expectation should lie in the area of our working needs

and current problems much more than in the area of filling a storehouse of ideas for some future, undetermined situation. The longer the time between the reading and the use of the idea the greater the chances of losing the idea forever.

2. Reading critically is far more productive than reading in full endorsement of the author's ideas. If we read endorsing or passively we might substitute the author's thoughts, conclusions and judgments in lieu of our own.

3. Keep in mind the author's plan of writing. This is more productive of ideas than merely reading pages. The usual article of value consists of a sequence of ideas in logical relationship. "Skimming" destroys the sequence and thereby limits the values that might otherwise be obtained from the reading.

4. At the time of reading the process should provide an understanding of what

TITLE: *How Visual Tension Indicators Improve Roof Support w/Bolts* TOPIC: *ROOF SUPPORT*

AUTHOR: *R. A. Gardner, Ch. Engr., New River & Pocahontas, Caples, W. Va.*

SOURCE: *Coal Age, August, 1958, Pg.*

RESUME: *Indicators eliminate guesswork in bolting. They show tension at time of installation, and indicate loosening or later loading.*

HIGHLIGHTS:

*Condition of bolting machine can be determined.
Costs are not excessive.
Roof falls eliminated in test area.*

QUOTES AND NOTES:

Tests led to improved bolting methods.

Revisions in bolting methods resulted in better overall performance and increased production.

Indicators are 98% accurate in their ability to flatten at tension of 8,000 lb.

USE: Evaluate these VTI's for use in our 2-Main West section.

LOCATION:

*Engr. Dept. Library,
Coal Age file*

PREPARING CARDS like this on the articles you read will provide concrete benefits and result in better management of your job-related reading.



Here's Why Bucyrus-Erie Dragline Buckets STRIP FASTER... LAST LONGER

Bucyrus-Erie dragline buckets are lighter and stronger because they are made with a specially-developed steel alloy called BECOLOY. It has a tough, fibrous structure that withstands shocks of great force . . . has high resistance to abrasion, high load-carrying strength!

BUCYRUS-ERIE buckets are balanced to carry loads smoothly without bobbing and spilling. Your operators can swing through each cycle faster to increase stripping production and profits.



This Model 1250-B uses a 33-cu. yd. bucket on a 200-ft. boom in stripping operations at Hanover, Pennsylvania. Machine is owned by Pennweir Construction Company, a subsidiary of Weirton Construction Co., Weirton, Pa.

Bucyrus-Erie buckets have BECOLOY in teeth, bucket lip, arch, clevis plate, and chains—the high wear parts of your dragline bucket!

FIND OUT NOW how you can increase both your production and profit with a new Bucyrus-Erie dragline bucket. They're available in light, medium, and heavy-duty types, solid or perforated. Call or write your nearest distributor today. Let him help you choose the right bucket to give your dragline extra output ability. Bucyrus-Erie Company, South Milwaukee, Wis.

50R59C

BECOLOY *makes the difference!*



you need less inventory when you

is being read, which should immediately spark a reaction to relate what is being read to the reader's own experience. Then the process should extend into making a plan to put the new learning into prompt use.

5. A simple system of note-taking will double the usefulness of what we read. It will also greatly increase reading efficiency by injecting the reading into working relationships which will make it pay off.

Mr. Zerfoss in his analysis then points out that reading is a complex process in which the reader must put to work a number of skills, including the following:

1. **The skill of condensing ideas**—This is what the writer does as he writes. He takes a body of information and fashions it into a reasonable perspective. He digests, summarizes and briefs his information into a package of ideas. The skillful reader keeps this in mind as he reads.

2. **The skill of amplifying ideas**—This is the opposite of the first skill. The reader expands the thinking of the writer by drawing upon his own experience to provide additional illustrations and details and to personalize the main points brought out by the author.

3. **The skill of selecting the unique contribution of the author**—Articles on any timely subject will have a certain amount of overlap because they will be based on a body of common knowledge. Some reference to this common knowledge is necessary to set the stage for each article. However, in each article there will be one or more additions to fact or a new point of view. Recognizing these unique contributions requires critical reading as opposed to passive reading.

4. **The skill of identifying possible uses and translating those uses into the reader's work**—This calls for an extension of the author's thinking and a deliberate attempt to tie his thinking to our own experience so that a new experience is projected into our work. The ability to do this is the heart of bridging from theory to practice, from ideas to action. It is the essence of reading for profit.

5. **The skill of associating key words**—This skill puts our memory to work for us where it does the most good, in helping us store and retain ideas for future use. Economy in reading is served when the reader's ability to associate key words or phrases with main points in the article is highly developed.

6. **The skill of relating what we read to basic principles**—A single idea or application appearing in an article is only of immediate and limited use until

it is related to a basic principle or a generally accepted theory. Then we are able to apply the single idea to many uses.

These are the skills which can be developed to help us get more value out of our job-related reading. But still there is that compulsion to put the reading to practical use. Mr. Zerfoss advocates the practice of preparing a file card on each article which contains personal job value immediately after the article is read. Without the use of the card, reading tends to be passive and use-delayed. Once the reading material is out of sight it is easily forgotten or placed in the "good intention" file, never to be seen again.

Use of such a card forces an extra reaction to reading. An immediate evaluation of usefulness must be made on the content of the article.

A 3x5-in file card can be used to make a good permanent record of a valuable article. As shown in the accompanying illustrations, patterned after Mr. Zerfoss' suggestions, the identification and theme of the article can be entered on one side of the card. Interesting quotes, key words and possible areas of application

are entered on the reverse side. Note that the location of the article or the issue in which it appears also is written down, making it easy to consult again the original information.

The use of file cards is one way of keeping your job-related reading alive. You may work out some other method more to your needs and liking. In any event such a system provides byproducts which can spread the profitable influence of intelligent, thoughtful reading. For example, an executive who takes the time to prepare such cards may route the cards to staff members who should study the particular articles for job information. Or a collection of such cards provides the quickest way to initiate a survey of current literature on a particular subject when a working organization launches a project in that field.

Getting right down to the heart of the matter, language and the written word are still our most effective means of communication. They are indispensable in doing our daily work. Just as with the other tools we use, we can achieve greater efficiency in reading by sharpening our skills and by approaching the reading activity with a plan of action.

This Is What I Believe . . .



Mr. Leman

THE PERSONAL PHILOSOPHY of Samuel C. Leman, president, Leman Machine Co., Portage, Pa., was published in a recent issue of the *Portage Dispatch*. Take a few minutes to read his meaningful statement. Here it is:

Recently I was asked this question: "What is your formula for success?"

I was flattered when I was asked because, frankly, I don't know what a person means when he uses the word

success. To some, success means a large portion of worldly goods; to others it means living and working honestly, sincerely, with faith in God and country.

I like to put myself among those who believe in this latter definition of success. The key words, according to my definition, are:

Honesty—The will to do the best you can; to do a little more than is necessary just to get by; to treat your fellow man fairly and to recognize that your own services have value.

Sincerity—To treat every project you undertake as though it were the only thing you were to accomplish; to recognize that every duty is an obligation which should be given a full measure of time, attention and skill.

Faith—To recognize that we are here through the will of God to deal fairly with each other, and that through faith we become better human beings. We must also put faith in our American form of government, realizing that under it we have all attained the highest standards of freedom in the world.

It might be said that it is odd that a man's life can be summed up in these three words. But there is an important fact that I would not want to overlook. I am grateful that what I have accomplished has been done in this area, among the finest people I know.

you need less inventory when you
specify **CARDOX**
augers and bits...

BECAUSE:

- Cardox augers and bits are engineered for longer life
- Serviced from conveniently located warehouses in principal mining areas
- Serviced by mining-men who know your problems

NEW CARDOX

HEAT-TREATED

ALLOY-STEEL ROOF AUGER

gives you 2 to 1 performance over others

Toughest ever... Cardox roof augers last longer! Constructed of tough alloy-steel, welded—then heat-treated for added strength and abrasion resistance. An added pitch of flight at the shank end gives added strength at the point of stress. Your costs go down with Cardox roof augers on the job. Available in standard lengths from 10' on up.

CALL ON CARDOX

for Immediate SERVICE

and lasting SATISFACTION

Rely on Cardox for quality carbide tipped-tools. Complete stocks at conveniently located warehouses permit delivery within a matter of hours when required.

Rely on Cardox for practical answers to all your drilling problems. Our Field Engineers are qualified underground mining-men with the experience and know-how to answer your needs efficiently, effectively and economically.

Call on us... where there's coal, there's CARDOX!



Roof Drill Bits
Sizes: 1 1/4" to 1 1/2"

Standard Auger Bit
Sizes: 1 1/4" to 3"

Continuous Miner &
Cutting Machine Bits

CARDOX CORPORATION • 307 N. Michigan Avenue, Chicago 1, Illinois

MINING
DIVISION
WAREHOUSES
and DISTRICT
OFFICES

Harper, West Virginia
Phone: Beckley
Clifford 3-4812

St. Clairsville, Ohio
Box #1
Phone: St. Clairsville 619

Louisville, Colorado
Phone: Boulder
Hillcrest 2-7298

Camden-on-Gauley, W. Va.
Phone: Camden-on-Gauley 2181

Benton, Illinois
Box 537
Phone: Benton 8-3821

Pikeville, Kentucky
Route 2, Box 571
Phone: Robinson Creek #5

Library, Pennsylvania
Box 427
Phone: Tommyson 3-6910

Evansville, Indiana
307 N.W. 5th Street
Box 84
Phone: Harrison 2-8944

Ottumwa, Iowa
Phone: Ottumwa
Murray 4-6564

OTHER CARDOX PRODUCTS... Carbon Dioxide Fire Extinguishing Systems and Foam Fire Equipment... Liquid Carbon Dioxide... Dry Ice
Airdox and Cardox Mining Methoax... Auger Miners... Central Compression Systems for Air, Helium, etc.



USCOLITE PLASTIC PIPE

Operating Ideas



Slope Belt Hauls Men Only

A NEW man-carrying belt conveyor designed by Hewitt-Robins, Inc., is transporting men up and down the manway slope at Johnstown Coal & Coke Corp.'s mine at Panther Gulch, W. Va.

The conveyor, 450 ft long and 26 in wide, extends from the mine entrance down a 20-deg slope to the coal bed, a 97-ft difference in elevation. The men lie face down or sit on the belt single file, about 15 ft apart, facing forward. Traveling at a speed of 150 fpm, they make the trip in 3 min.

The unusual conveyor, called the Manveyor, is believed to be the first ever installed in a mine to carry personnel exclusively. It was installed at the West Virginia operation instead of a conventional mine elevator in a vertical shaft because engineering studies indicated it would be more economical and faster than an elevator.

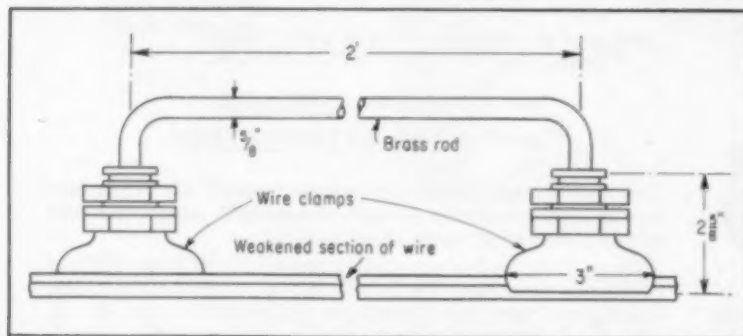
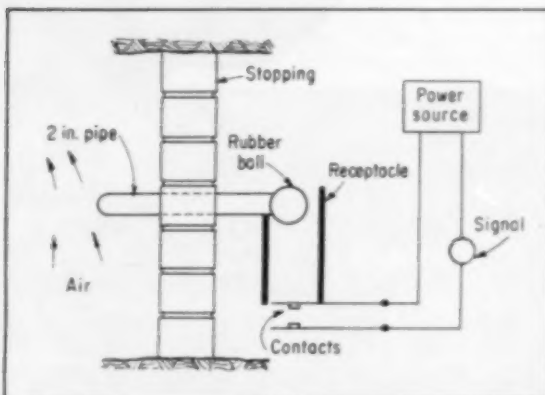
Running continuously during each shift change, the conveyor moves the miners safely and smoothly at a rate of one every 6 sec.

Ball Operates Fan Signal

HERE'S an unusual, simple device developed by Obie Hall, former lampman at No. 3 mine, Powellton Coal Co., Mallory, W. Va., to operate a warning signal when the mine ventilating current stops or is short circuited.

James T. Sauls, Man, W. Va., who submitted the idea, says that a piece of 2-in pipe is inserted through a stopping and extended a convenient distance. A rubber ball is placed against the pipe opening and a receptacle is fitted under the end of the pipe. Air pressure holds the ball in the pipe. Two normally-open contacts at the bottom of the receptacle are connected to a power source and a signaling device.

When the fan stops or the air current is short circuited, the rubber ball falls into the receptacle and closes the contacts in the signal circuit. Mr. Sauls says either a storage battery or 110 V AC may be used to operate a bell or light.



Bridge Simplifies Trolley Wire Repairs

EMERGENCY REPAIRS to trolley wire are simplified with this shop-made bridge developed by J. K. Paul, Oak Ridge, Tenn. He points out the device is especially valuable to the repairman who

sometimes makes repairs while the power is on.

Mr. Paul says the bridge is handy for the following jobs: (1) Where the wire is weakened by arc burns or fatigued by

straightening a kink; (2) to bridge a defective splicing sleeve; and (3) to serve as a nipping point so power can be temporarily taken off the wire without interfering with current collectors.

The unit consists of a hard $\frac{5}{8}$ -in brass rod bent into a U shape and threaded at each end. Conventional trolley-wire clamps, provided with special nuts to fasten trolley wire guard, are secured to each end. Over-all length is 2-ft; thus it can be carried easily in a repairman's tool bag.

To take the stress off the defective section of wire, the bridge can be placed in tension. Here is how it is done. Place the bridge clamps tightly on the wire. Then while holding the bar with gloved hand, strike one and then the other clamp from the center of the bridge. The clamps move outward on the wire, the bar arches and removes some of the tension in the defective area.



USCOLITE PLASTIC PIPE

PIPE DREAMS come true!

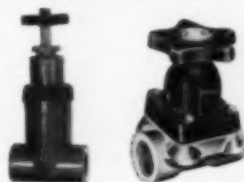
Mr. Usco introduces the complete family of pipe, valves and fittings!



USCOLITE® plastic pipe comes in two specific types, each equally good for its particular purpose. Uscolite CP for high impact resistance, Uscolite RV (PVC) for active oxidizing agents. Not one foot of pipe has had to be replaced in the 10 years since first installed.



USCOLWELD® Fittings are the only solvent-weld fittings with an interference fit. Greater joint strength, faster insertion. Non-porous, leak-proof. Made of either Uscolite CP or RV materials.



USCO® VALVES offer a choice of either Hills-McCanna diaphragm valve or Vanton "Flex-Plug" gate valve.



USCOFLOW is a new, black utility pipe, especially suited where low first costs are a factor. It is a blend of styrene-base resin and synthetic rubber for good impact resistance and high tensile strength.

The "Usco" Plastic Pipe Line of precision-molded pipe and fittings for every corrosion and flow problem includes elbows, tees, couplings, flanges, reducing bushings, plugs, caps, nipples, bends.

Mechanical Goods Division



United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N. Y.

In Canada: Dominion Rubber Company, Ltd.

Operating Ideas (Continued)



LESS DOWN TIME and easy replacement are benefits of a new shroud link developed for continuous miner.

New Link Cuts Downtime

FOUR DISTINCT BENEFITS are credited to an improved two-part shroud link for a Joy 4CM continuous miner developed by Woodrow Husk, welder at Warwick mine, Duquesne Light Co., Greensboro, Pa. Warwick management cites the following advantages of the new shroud link:

1. Either half can be replaced very quickly and easily in a few minutes. Thus miner downtime is held to a minimum. And, the pickup head can do an efficient job throughout

every shift in keeping the bottom of the working place clean.

2. The weld is extremely strong and cannot be accidentally knocked off.

3. The cost of the improved shroud link is only about one-third that of the original link.

4. Daily trouble with shroud links is eliminated.

The improved links were installed in July, 1957, and are still giving good service. The new units are bolted together in three places with $\frac{3}{4}$ -in. cap screws. To attach the new two-piece unit to the miner frame and pickup head, a specially machined 8-in. pin is welded to the frame and head. The shroud links can be attached simply by removing the three cap screws and slipping each end of the shroud on its own end of the pin.

As constructed on original equipment, one section of the hinge pin was welded to the miner with three small welds, and the other section welded to the shroud link itself in the same manner. These sections interlocked and were held together by a $\frac{3}{4}$ -in. bolt.

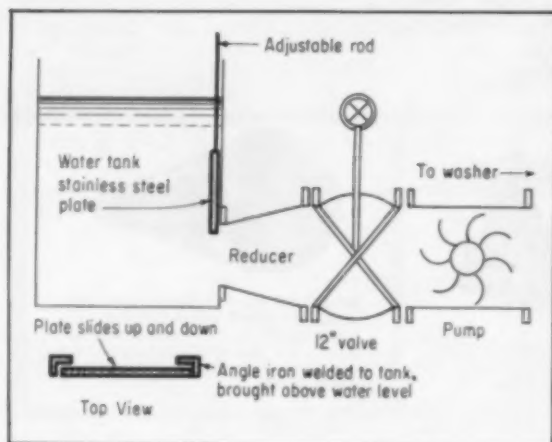
Warwick management reports that the original design was unsatisfactory for the following reasons:

1. There was insufficient welding surface available to weld "ears" to the miner or shroud. Quite often when the chain was too loose or bits were too long, the chain would hit these ears and they would break off.

2. These "ears" would break frequently and it was a time-consuming job to replace them. It could be done only at the end of the shift or on weekends. The machine operating without one or both of these shroud links did not do an efficient job of cleaning up the bottom.

3. The original shroud was all in one piece and if any part of it broke the entire shroud had to be replaced.

4. The original shroud was too light in construction to do the heavy work for which it was intended.



Flow-Control Device Cuts Cleaning Plant Maintenance

LONGER LIFE for an expensive 12-in. gate valve and elimination of the frequent need for draining the sludge tank when making pump repairs or replacing lines are top gains resulting from installing a simple flow-control device in the sludge tank at Duquesne Light Co.'s Warwick preparation

plant. Designer of the flow-control device is Harold Robbins, shop mechanic at Warwick mine, Greensboro, Pa. The new unit consists of a stainless steel plate that can be positioned in angle-iron guides to regulate flow to a pump supplying water to the third-floor washer room.

In the cycle of washing coal at the Warwick plant, the water from the washer tank is discharged from a 10-in. opening at the bottom of the tank, then through a 12-in. gate valve into the suction side of the centrifugal pump supplying water to the third-floor washer room, where coal and refuse are separated by a specific-gravity process.

The volume of material being washed and the refuse content of the coal and refuse mixture determine the volume of water required, and thus the extent to which the 12-in. gate valve should be closed. When it was necessary to operate this valve in a partially closed position, the refuse in the water plus the strong force of the suction caused excessive wear on the exposed portion of the valve. As a result, life of the gate valve was less than 1 yr.

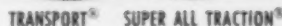
In addition to the high maintenance cost, when the valve did need to be repaired or replaced, it was necessary to drain the tank and have the washer inoperative until repairs were completed. In fact, in making any repairs such as packing the pump or replacing lines, the valve usually was worn so much that water could not be completely shut off and it was necessary to drain the tank.

The new stainless-steel regulating device can be raised or lowered to control the flow of water to the pump. The 12-in. gate valve then can always be kept in the full open position, except when repairs are to be made, thus eliminating practically all wear on the movable part of the gate valve.

FIRESTONES!

[illegible]

No wonder that, now more than ever, more truck operators are changing over to Firestone tires. Ask about Firestone Rubber-X at your Firestone Dealer or Store. That's the place for fast dependable service, too.



BETTER RUBBER FROM START TO FINISH

133

PROFILE OF AN IDEA MAN

Equipment Developments



Portable Mining Cable Skids

Emphasis on safety highlights new mining cable skids made by General Electric Co., Schenectady 5, N.Y. The skids serve as portable switching stations for distribution of AC power throughout open-pit and underground mines. Oil-filled power circuit breakers with either manual or electrical operation are utilized. Ratings from 4.16 to 7.2 kv with short circuit capacities from 25 to 150 mva, and an insulation level rating of 75 kv B.I.L. are available. Four designs are made, two for surface and two for underground applications, in weights ranging from 1,600 to 3,450 lb. Dimensions of surface equipment are 46x42x78 in and 46x48x98 in—for underground equipment dimensions are 42x42x78 in and 42x48x98 in. Grounding safety is said to be emphasized by a ground continuity check system which uses an auxiliary disconnect in the primary coupler to provide a monitoring circuit. The circuit is completed last when the coupler plug is inserted in the socket and interrupted first when the plug is removed.



Primer for Ammonium Nitrate

A new high-velocity gelatin explosive for priming ammonium nitrate and other low-cost blasting agents is now being offered by American Cyanamid Co., New York 20, N.Y. Called CX-311 primer, it is designed for optimum detonation of free-running blasting agents in stripping and open-pit mining. The cartridge has a 5-in sleeve or Prima-tube positively attached to and extending along the length of the outer cartridge wall, which facilitates loading by permitting the primer to slide along

the Primacord, keeping it close to the cartridge. Length is 6 in, diameter is 2½ in and weight is 1½ lb. Field tests are reported to have been good, and one primer unit is recommended per 80 lb of fertilizer grade ammonium nitrate.



Capacity Up for Dump Truck

Payloads of 10 yd or 30,000 lb can now be handled by the new Model 100 Dumptor made by Koehring Co., Milwaukee 16, Wis. The larger unit also features no-turn shuttle hauling made possible by dual controls and a pivoting seat which permits the operator to drive in either direction without having to turn the Dumptor around. Constant mesh transmission and torque converter drive provide maximum loaded speed of 6½ mph in low range and up to 20 mph in the other range, high. A free swinging kick-out pan, instantaneous gravity or controlled dump, and 65-deg dump angle are featured. Power steering and the ability of the steering axle to oscillate up to 18 in aids maneuverability and spotting, and helps keep twisting strains out of the main frame. The machine is reported able to climb 28¼% grades fully loaded.



Rugged 1½-Yard Shovel

A versatile new 1½-yd shovel has been added to its line of crane and excavating equipment by Manitowoc Engineering Corp., Manitowoc, Wis. Model 2300 is reported easily convertible to 1½-yd clamshell or trench hoe, 1½- to 2½-yd dragline or 35-ton crane. Highlights of the new design are noted to be hydraulic jack adjustment of the crawler drive, extra-tough king pin, flat-designed 62-in roller path, simple

PROFILE OF AN IDEA MAN

who can help you improve lubrication performance!



He's trained to know *your* business. He's an Amoco mine lubrication engineer, a man with ideas, *big* ideas about saving you lubrication money and solving lubrication problems.

Take diesel lubrication, for example. If you've used an S-1 oil in your diesel equipment, he may suggest switching to Super Permalube. This remarkable oil can make a sizable improvement in diesel performance. For, in addition to being an S-1 oil, Super Permalube has these desirable advantages:

★ High viscosity index for ease of starting in cold weather and at low engine temperatures (Super Permalube doesn't thicken at low temperatures or thin out at high temperatures.)

★ Greater piston seal for savings on oil consumption.

★ Super lubrication qualities that cut friction so effectively and improve engine performance to such a marked degree you actually save on diesel fuel!

Your Amoco mine lubrication engineer may recommend Amoco's Superior Diesel Oil S-1, S-2 or S-3. Or he may suggest using Super Permalube Motor Oil. Whichever Amoco product you may use you are assured of superior lubrication.

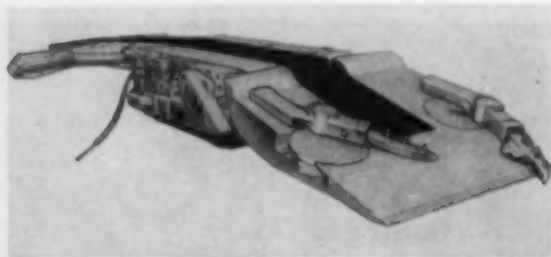
Get a survey free of cost. Call your nearest Amoco office today or write to American Oil Company, 555 Fifth Avenue, New York 17, New York.

AMOCO LUBRICANTS
FOR MINE MACHINERY



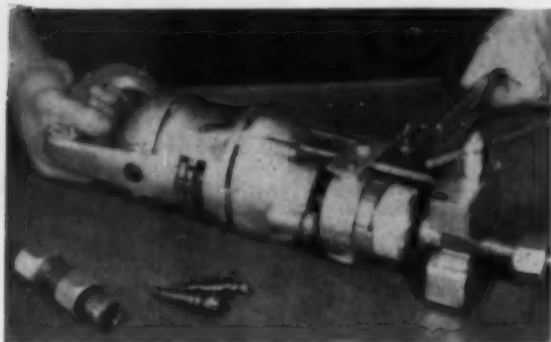
When you want top performance, you want Amoco

design with only eleven gears in upper deck machinery and a central lubricating point from which all major grease points can be reached at once. Torque converter, air controls and a self-removing counterweight are optional features on the unit.



New Low-Loader

The "lowest high-capacity loader in use today" is how the Long Co., Oak Hill, W. Va., describes its new 25 $\frac{1}{4}$ -in-high Model 188-D. A feature of the machine is a specially-designed swing boom that is useful in working with Piggyback bridge conveyors as well as shuttle cars. A flat digging angle combined with recessed digging arms permit lifting the counterbalanced head up to 10 in off the bottom without the strokes exceeding the overall height of the machine. Long notes a simplified design with far fewer control and mechanical parts than ordinary loading machines. The 188-D has a single 40-hp motor, only one speed reducer and one motor control.



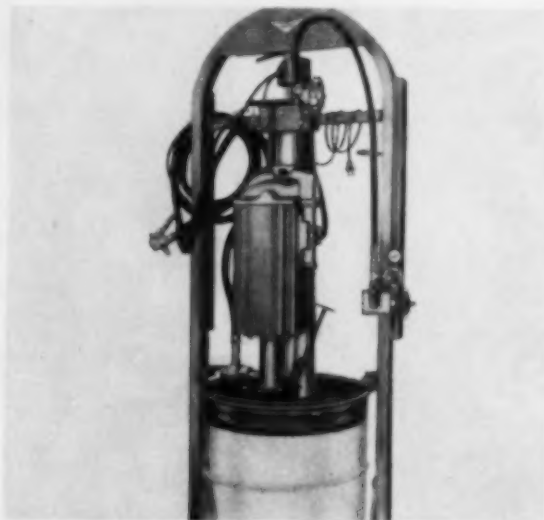
Portable Tool Flares Tubing

Shown above is a portable motor-driven tubing flarer made by Parker-Hannifin Corp., Cleveland 12, Ohio. The Portafire utilizes a heavy-duty universal gear head electric motor operating on DC or 60-cycle AC 115-V power. Fully annealed steel and stainless steel hydraulic tubing, as well as tubing of other materials, in sizes from $\frac{1}{4}$ through $\frac{3}{4}$ in outside diameter and in wall thicknesses up to 10% of tube diameter, can be flared. Individual ball cones are used for each size and wall thickness of tubing. Features are noted to be unique flaring head and feed lever with specially designed tube holding clamp, ball and roller bearings used throughout with permanent lubrication and a cast aluminum frame. The tool may be clamped in a vise or hand-held, when necessary.

Mine Power Safety Control

Mine safety is advanced with a new power system control for mines made by Femco, Inc., Irwin, Pa. The control operates so that all power in the mine is removed when any fan stops. Using a single pair of wires only, the system is claimed to provide both automatic and manual control of all

circuit breakers. A central control cabinet synchronizes up to 22 locations, including fans, into a single system. If desired, the system can be installed to control all fans from a central location, and to shut down and lock out all fans until it is safe to re-start them. Rugged construction, low cost, extreme reliability, ease of maintenance and long life are noted for the system.



Lubrication Equipment

Lincoln Engineering Co., St. Louis, Mo., is offering a new air-operated pressure primer, the Dyna-Ram, and a new air-operated forced-induction pump, the Pile Driver (shown above), as part of its new line of industrial lubrication equipment. In addition to the usual fluid materials these pumps are reported to handle extra-heavy lubricants and "non-flowing compounds." Dyna-Ram is said to empty and clean 55-gal drums, even dented ones, right to the bottom, while Pile-Driver is supposed to be able to pump anything that can be pumped.



Improved Tractor-Scraper

Horsepower has been increased to 335 and capacity to 21-yd struck and 28-yd heaped on the Model B Tournapull made by LeTourneau-Westinghouse Co., Peoria, Ill. Low range speeds have been increased to 20.7 mph and top speed in high range is now 30.1 mph, while acceleration has also been increased. Featured are: smooth, unobstructed bowl interior, minimum 1-deg tilt of bowl floor for easy loading, precisely curved tailgate and anti-spill grid which promotes a full rolling action. Positive electric control of the tailgate, more than 7-ft apron lift and a quick drop mechanism on the bowl lift are said to add efficiency. Other trailing units in addition to the scraper are available for use behind the prime mover.

B.F. Goodrich



B.F. Goodrich tires give miner 25% more mileage than other makes!

WINTON Coal Mining Company works the strip mines in and around Tamaqua and Coaldale, Pa. Eighteen dump trucks haul tons of coal 15 miles over winding, mountainous roads. Low tire mileage and premature failures were problems for Winton until the company switched to B.F. Goodrich tires. Result: tire failures way down, mileage up as much as 25% over other makes—even two retreads.

Winton uses the Rock Logger tread which, like the new Rock Service, Universal and other B.F. Goodrich tires for mine work, is specially compounded to resist rock cuts and bruises. Rugged

cleats bite in for full traction in forward or reverse. For extra-rugged jobs, you can get tires with B.F. Goodrich FLEX-RITE NYLON construction.

FLEX-RITE NYLON construction provides double the impact of ordinary materials, resists heat blowouts and flex breaks. This B.F. Goodrich cord body outwears even extra-thick treads, can be retreaded again and again!

See your B.F. Goodrich dealer today. He's listed under Tires in the Yellow Pages of your phone book—and he has money-saving tires for every mining job. B.F. Goodrich Tire Co., A Division of The B.F. Goodrich Co., Akron 18, Ohio.

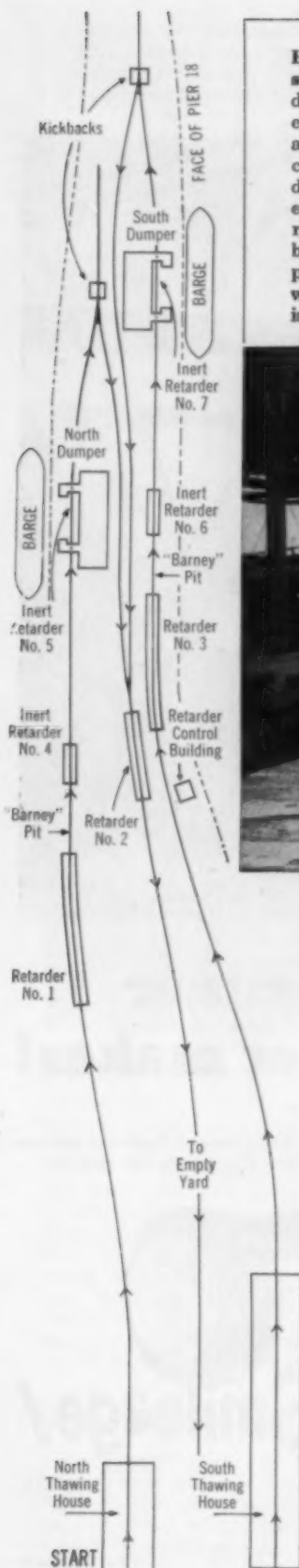
Specify B.F. Goodrich Tubeless or tube-type tires when ordering new equipment



B.F. Goodrich truck tires

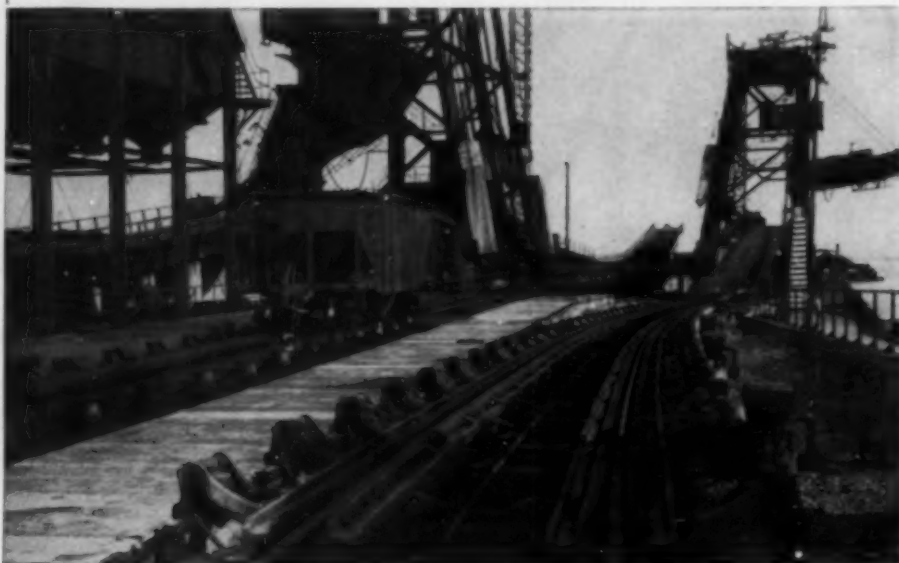
COAL AGE • September, 1958

© The B.F. Goodrich Co.



How the new UNION car-retarder system works — Pier 18 has two coal dumping systems and both use the same empty yard. Following through the operation of the North dumper, a loaded coal car leaves the North thawing house, rolls down an incline to retarder No. 1 where its exit speed is reduced, so that when the car rolls on to the "barney" pit, it is stopped by inert retarder No. 4. A "barney" then pushes the car up the slope to the dumper where it is stopped by retarder No. 5. Coal is then dumped into a barge.

The next full car pushes the empty car off the dumper. It goes by gravity through a kickback and spring-switch combination for return through retarder No. 2 to the empty yard. Controls for the power retarders and switches are incorporated in a control machine housed in a new tower building. One operator in this tower surveys the operation and operates the control machine. He has loudspeaker communication with the thawing sheds, the control cabins on the dumpers, and the yard office.



General view of North and South dumpers showing No. 2 and 3 retarders in foreground. Car entering retarder is going to the empty yard.

Fast, low-cost coal handling results from Automation at Pier 18

The Central Railroad of New Jersey recently modernized its coal dumping facilities at Pier 18, Jersey City, N. J. Now, one man sits in a tower, flicks a few levers, and controls loaded coal cars rolling by gravity to the dumpers and empty cars moving from the dumper to the empty yard. Formerly, this job required a crew of car riders and was a costly and hazardous operation.

Now, the job is handled quickly, safely and economically through a

system of UNION Electro-Pneumatic Car Retarders. Operating costs have been greatly reduced, and coal is promptly loaded for shipment by barge to New York and New England areas.

What is your materials handling problem? If it involves many carloads of coal, ore or other products, let us show you what can be done with automatic car-retarder systems to increase efficiency and reduce costs. Write for information.

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
SWISSVALE, PENNSYLVANIA
NEW YORK.....PITTSBURGH.....CHICAGO.....SAN FRANCISCO



open motors for extreme conditions

Save up to 60%!

Here's an amazing advance in motor technology! It's the *Super-Seal* motor line — an open motor design so completely unaffected by moisture, dust, dirt, oil, acids and alkalis that it can be used in many applications previously requiring more costly enclosed motors. *Savings range from 15 to 60%.*

Super-Seal motor superiority results from revolutionary insulating techniques. Available in any integral horsepower size, smaller *Super-Seal* motors incorporate an encapsulated stator. A durable epoxy resin encloses the stator, creating an electrical system impervious to outside elements.

In larger sizes, *Silco-Flex* insulation is used. In this system, silicone rubber is vulcanized into a homogeneous mass to form a flexible, moisture and heat resistant, void-free dielectric barrier around coils and leads.

Both of these insulation systems are unsurpassed. Proof? An encapsulated motor ran for hundreds of hours at full load in a 4% brine solution.

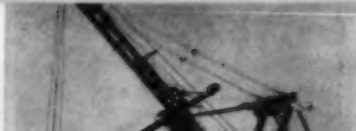
Find out more about new economies in motors from your A-C representative or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin. *Silco-Flex* and *Super-Seal* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

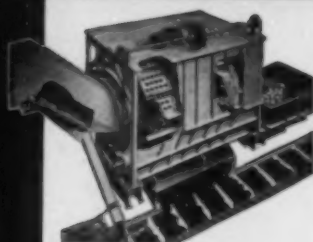


A-5802

Tubular High-Strength

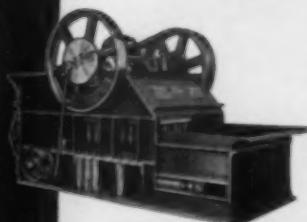


America's most
complete line of
CRUSHING EQUIPMENT



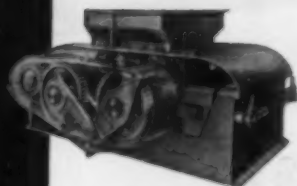
**McNally Pittsburgh
Rotary Breaker**

This unit allows positive control of top size in handling run-of-mine washery feed. Production of fines is held to a minimum.



**McNally Norton Vertical
Pick Breaker**

30% Less fines when reducing lump to egg and stove sizes.



**McNally Double Roll
Gearmatic ROM Breaker**

Built in tonnage ranges from 750 tph to 1400 tph. Full floating gearmatic drive.



**McNally Gearmatic Stear
Coal Crusher**

This unit offers three prime advantages: high volume production, plus accurate sizing, plus low percentage of fines.



McNally Single Roll Crusher
Universal application 20", 24"
and 36" diameter rolls.

AVAILABLE

From Stock and on Short Delivery

For immediate action on complete information write, wire, or call.

McNALLY PITTSBURG MFG. CORP.

Pittsburg, Kansas

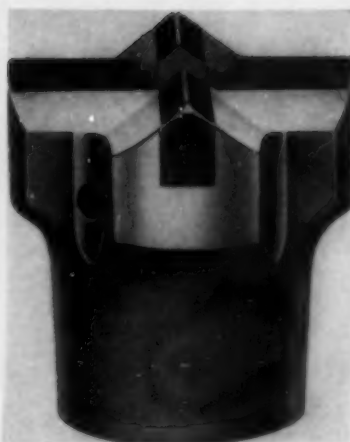
Wellston, Ohio

Equipment News (Continued)



Line Filter Protects

An easily installed line filter which is reported to prevent harmful minute particles of dirt from causing wear in hydraulic power systems is now being offered by Schroeder Bros. Corp., McKees Rocks, Pa. Equipped with a standard low-cost filter element, the line filters come in selection ratings of 3 to 40 microns. Working pressures of 250, 500, 1,000 and 2,000 psi and capacities up to 150 gpm are available. An integral low-pressure high-volume relief protects the filter element and reduces fittings to IN and OUT external lines. Maximum temperature rating is 275 F. Dirt particles as small as 0.000118 are claimed to be removed from hydraulic lines. The filter element can be changed in a minute or less because of the filter housing's flip-top cap.



Rock Bit Easily Extracted

In rock formations where better clearance is needed and extraction of the bit is difficult, the carbide Rok-Bit shown above is claimed to be at its best. The manufacturer, Brunner & Lay, Franklin Park, Ill., reports the bit has self-clearing chip channels and fast cutaway wings designed to minimize binding and drag. It is available in gauge sizes from 1½ in through 4 in.



Drying Feeders

Heavy and extra-heavy electromagnetic feeders are now available with special direct panel-heated troughs from Syntrol Co., Homer City, Pa. A cascaded series of electrically heated panels, loosely interlocked to act as louvers, and allowing forced air from a turbo-blower system to be blown through and across the material being fed to dissipate vapor, produce efficient drying. Panels can be pivoted and heat intensity regulated to control the desired moisture reduction, it is claimed.

Belt Conveyor Scale

A unitized pneumatic belt conveyor scale which is reported easily installed on existing flat-belt or troughed conveyors with minimal downtime and modification to the conveyor has been announced by Weighing & Control Components, Inc., Hatboro, Pa. The scale employs a flexural frame arrangement to deliver a single component of force

Tubular High-Strength Steel dipper stick is stronger and lighter

The picture shows a plate of High-Strength Steel that has been formed into one of the stiffest, strongest structural shapes known to man: a tube. It will become an amazingly light and tough dipper stick and permit a shovel to operate with greater cycle speed and capacity. In addition, the design and the steel combine to give it tremendous resistance to bending and shock loading, even at

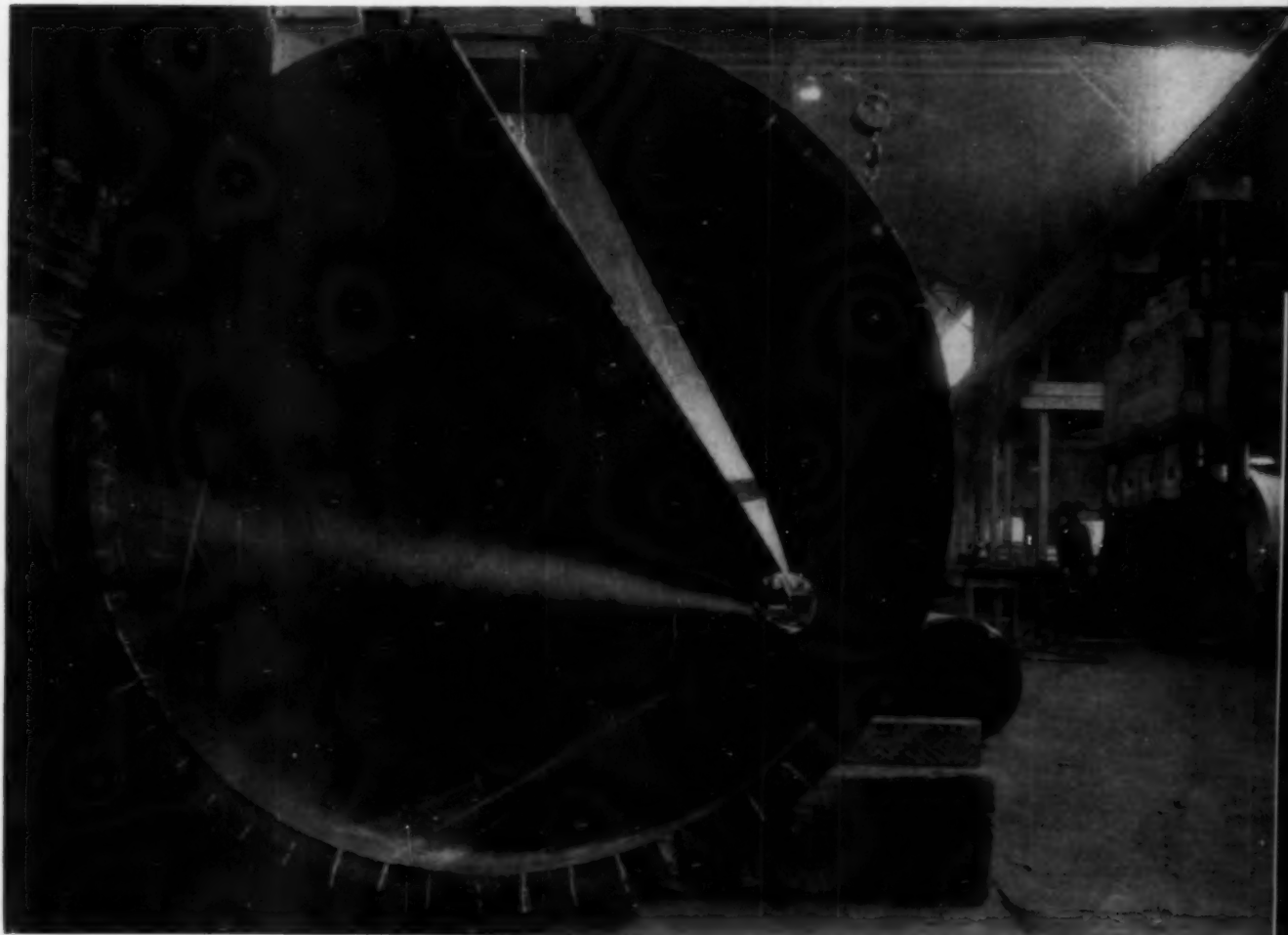
very low temperatures.

Both USS® TRI-TEN High-Strength Low-Alloy Steel and USS T-1®, a Constructional Alloy Steel, have been used in the most highly stressed members of many shovels—in booms, crowd members, buckets, bail assemblies and frames. They respectively offer increased yield strengths of about 1½ and 3 times that of structural carbon steel, along with

good welding qualities and excellent toughness. Both steels are helping the present-day operator achieve one of his most important goals: to move more and more material at less cost.

When you invest in mining machinery that must do heavy work, specify USS TRI-TEN® or USS "T-1" Steel for faster, longer, more trouble-free operation. Your builder can give you details.

USS Tri-Ten Steel dipper handle during fabrication at National Annealing Box Co., Washington, Pa., for Bucyrus-Erie. Sizes of high-strength and alloy steel dipper sticks made here have ranged up to 40" x 77" with 1.75" wall thickness.



United States Steel Corporation - Pittsburgh
American Steel & Wire - Cleveland
Columbia-Genova Steel - San Francisco
Tennessee Coal & Iron - Fairfield, Alabama
United States Steel Supply - Steel Service Centers
United States Steel Export Company



United States Steel

localized wear...

is this your wire rope problem?



**FREE Red Strand Bulletin No. 106 tells
how to lengthen wire rope service life
when greatest wear is in specific areas**

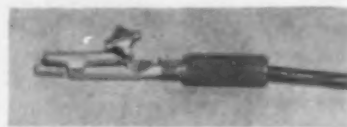
Why is it that wire rope is often severely damaged near one or both ends while the rest of it is perfectly sound? Obviously, you can't afford to discard the whole rope. So, what can you do to correct or compensate for this condition? These and related questions are fully answered in Service Bulletin No. 106, one of a series designed to help users get more efficient, more economical service from wire rope. Copies are sent free. Write H. K. Porter Company, Inc., Leschen Wire Rope Division, 2727 Hamilton Avenue, St. Louis 12, Missouri.



H. K. PORTER COMPANY, INC.
LESCHEN WIRE ROPE DIVISION

Equipment News (Continued)

without pivots, knife edges or bearings. Rate of flow of material in terms of weight can reportedly be indicated, recorded, totaled, proportioned or programmed. Coming in a variety of sizes for either fixed or variable speed conveyors, the unit is mounted above the conveyor.



Simple Ground Clamp

Pictured above is a simple ground clamp that is reported to require no tools to connect a cable to it or fasten the clamp to a rail or return feeder. Cable connection is made by insertion into the taper-drilled stem and then turning the knurled handle tight. The clamp is fastened by tightening the set screw by hand. Its manufacturer is Coal Machinery Research, Inc., Logan, W. Va.



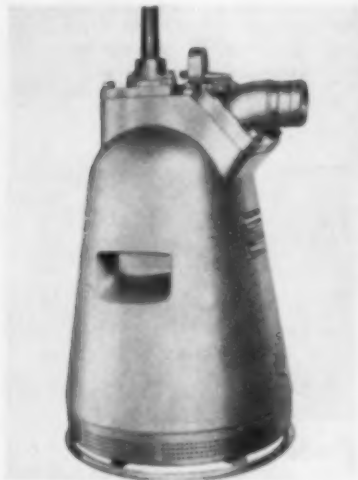
Roll Crushers

Eagle Crusher Co., Galion, Ohio, has announced two new roll crushers in sizes 24x20 and 30x24. Rolls are manganese steel and units come with either both rolls smooth, or both corrugated, or one of each. Heavy duty tension springs are cited as allowing one roll to float while the other is fixed, thereby providing for passage of foreign materials which might otherwise damage fixed rolls. Screw adjustment of the opening between rolls up to 3-in maximum is possible. The smaller unit weighs 12,000 lb and needs 75 to 125 hp, while the larger unit weighs 16,000 lb and needs 100 to 200 hp.

Steel Cord Protects Tires

Two criss-crossed steel breaker strips built in beneath the tread protect the new Nylon Steel Guard tires against sharp puncturing objects. Goodyear Tire & Rubber Co., Akron 16, Ohio, recommends the nylon reinforced tire for

heavy industrial uses including mining. Available sizes are: 8.25-20 through 12.00-24 in Road Lug tread design and: 11.00-22, lug 14, 12.00-24, lug 16, and 12.00-24, rib 16, in Hard Rock Steel Guard Nylon design. All are reinforced with nylon.



Swedish Mine Pump Design

Fully-submersible, electrically-operated mine pumps of Swedish design are now being made by Stenberg Mfg. Corp., Hoosick Falls, N.Y. The Flygt pumps are said to be able to drain water down to one-in depth, do not suffer damage if allowed to run dry and will start instantly when water flows into the sump. It is claimed that they can handle a very high proportion of solids without difficulty, that they require little maintenance and that no suction hose is needed. The largest weighs 1,250 lb and pumps 1,500 gpm at a 65-ft head with 67 hp. The smallest weighs 79 lb and pumps 10 gpm with a 65-ft head.



Non-Slip Pulley Lagging

A non-slip material with a granular surface has been announced for pulley lagging by Minnesota Mining & Mfg. Co., St. Paul, Minn. The Scotch-Tred brand covering is said to have the flexibility and pliancy to conform to all types of pulleys, the durability to with-



In this mine, slate is separated from coal underground and carried on another Quaker conveyor belt to the slate pile.

For fire-safety and ruggedness underground, SPECIFY QUAKER FIRE-RESISTANT CONVEYOR BELTING U.S.B.M. 28-11

Jagged chunks of coal and slate fall ten feet from the entry belt to this Quaker mother belt in one underground tippie. After 2½ years of constant service, the 2500-foot belt is still as good as new.

Now made especially for underground use where fire-resistance and flame-retardancy are musts, Quaker belting meets U.S. Bureau of Mines Designation U.S.B.M. 28-11... in fact, far exceeds the standards set for it. For example, test flame was extinguished immediately, and afterglow disappeared in one-third the permitted time.

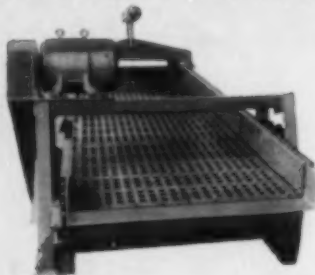
Call your Quaker industrial distributor for the full story, and for valuable assistance on all problems involving industrial rubber products.



FREE BELTING CATALOG
giving complete information on all standard grades of Quaker conveyor belting. Illustrated. For a copy, write QUAKER RUBBER DIVISION, H. K. PORTER COMPANY, INC., Philadelphia 24, Pa., or Pittsburg, California.

H. K. PORTER COMPANY, INC.
QUAKER RUBBER DIVISION

HENDRICK H QUALITY STEEL PLATE SCREENS COAL MORE ECONOMICALLY



Tough and rugged Hendrick H Quality Steel Perforated Plate lasts longer, even under continuous and heavy-duty use, because it is made from heat-treated high-carbon steel. It screens coal easier and faster, while the full clearance of its perforation reduces downtime costs due to blinding. Product uniformity is assured throughout the life of the screen. For all these reasons, Hendrick H Quality Steel

Plate can make the difference between profit and loss in coal preparation. Order Hendrick H Quality Steel with either flat, corrugated, or stepped surfaces, in any desired shape and with any size of perforation. Whatever you order, you get Perforated Plate which reflects Hendrick's 82 years of experience in selecting the steel the mining industry needs.

Hendrick

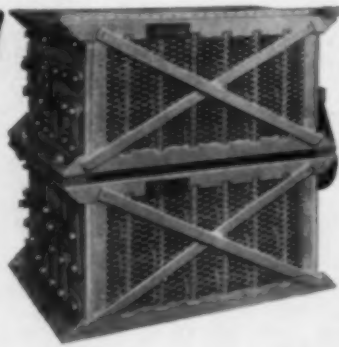
MANUFACTURING COMPANY

41 DUNDAFF STREET

Perforated Metal • Perforated Metal Screens • Wedge-Slot Screens • Hendrick Wedge Wire Screens
Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treeds
Armogrids • Hydro Dohazors • Distillation Column Internals

CARBONDALE, PA.

*What do YOU need
in a Locomotive
Resistor?*



**GUYAN offers you
these advantages:**

PROTECTION—for your motor and controllers, **LONG SERVICE LIFE**—without warping and buckling; **SMOOTH STARTING**—without dangerous jumps between points; **HARD SERVICE REQUIREMENTS**—engineered and designed for your locomotive and mine conditions; **ECONOMICAL PRICE**—low first cost and maintenance freedom.

GUYAN Locomotive Resistors are recognized in the mining industry for their ruggedness and dependability. They are built to withstand rough usage in locomotives and moving machinery where excessive vibration and shock make the more fragile grid types undesirable. Write for details.

GUYAN MACHINERY CO.
LOGAN, W. VA.

Guyan
RESISTORS

Equipment News (Continued)

stand continual stopping and starting, and the ability to grip a conveyor belt without scoring or cutting it. Thinness of the covering is 50 mils, assuring that its application will not materially affect pulley ratios. Application involves cleaning the pulley, stripping a backing from the covering and pressing it into place—it sticks immediately without drying or curing. The material, which has also been used as a covering for belts, comes in a variety of sizes.

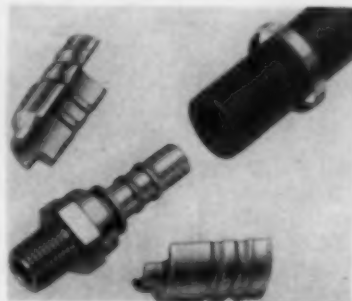


Blade Bites Better

Pictured above is a new tooth-type scraper blade marketed by Electric Steel Foundry Co., Portland 10, Ore. Field reports on a 15½-yd scraper equipped with the new cutting edge showed loading time cut in half when working in limestone and shale, with substantial loading time reductions in other materials also.

Rock Drill

Worthington Corp., Holyoke, Mass., is making a new heavy-duty 4-in Blue Prute drifter drill with standard, neutral and reverse rotation. While retaining all the basic features of the manufacturer's current drilling units, the new drill is reported interchangeable with drills now in service. This is said to result in economical conversion of existing equipment for rock drilling with sectional coupled steels.



Hose Features Fittings

A new truck air brake hose and segmented fittings made by Aeroquip Corp., Jackson, Mich., are said to reduce initial



Bottom-Dump Coal Haulers have capacities of 25, 40 and 51 tons... engines from 218 to 360 h.p. ... dual or large single drive and trailer tires ... torque converter and Torqmatic drive or standard transmission.

- **Higher Availability**
- **More Tonnage**
- **Lower Costs**

On scores of mining operations all over the world the high job availability of Euclid equipment results in more tons hauled per shift. Because they're engineered and built for the toughest off-the-highway service, "Eucs" stay on the job longer, with less time out for servicing and repairs.

Dependable low cost hauling has made Euclid the preferred equipment for open pit operations in both the bituminous and anthracite fields. If you're interested in cutting your hauling cost for coal, overburden or waste, have your Euclid distributor prepare a production and cost estimate for your operation. There's a good chance he can show you how to haul more tonnage at lower cost.

EUCLID DIVISION, GENERAL MOTORS CORPORATION, Cleveland, 17, Ohio



Rear-Dump models are available in 10, 15, 18, 22, 27, 40 and 50 ton capacities with engines of 128 to 670 h.p. ... standard transmissions or torque converters and Torqmatic drive ... semi-trailer types have capacities of 12, 22 and 35 tons.



EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE





EXIDE-IRONCLAD BATTERIES

—best buy for the long haul

More ton-miles per dollar—that's the reason most cost-conscious mine operators prefer Exide-Ironclad Batteries for mine locomotives.

Experience has proved over the years that no other battery make matches Exide-Ironclad for average life in service and tonnage hauled. Rating for rating and dollar for dollar, Exide-Ironclad gives you more real value . . . more return on your investment.

Today's Exide-Ironclad features improved tubular construction, making it even better than the models that chalked up the industry's records. So you can expect even longer life potential and superior performance.

Total work output, not mere price, is the key to battery economy. When you buy batteries, specify Exide-Ironclad and get the most production capacity your dollar can buy. For details, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 2, Pa.

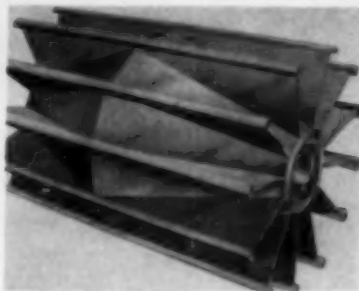


High-capacity, long-life tubular construction. Gives positive plate one-third more surface area for greater power reserve. Power tubes hold active material securely for long battery life.

Exide®

Equipment News (Continued)

cost and speed on-the-spot replacements. Both the 2550 Type "A" hose, available in lengths up to 60 ft, and the 2570 Type "B" hose, available in coils up to 300 ft, meet SAE specification 40R2. Aeroquip claims that only a pair of ordinary hand pliers is needed to assemble the segmented fittings. In addition, are available to fit every application.



Two Pulleys Feature Hubs

Two new lines of pulleys, both with "Taper-Lock" hubs, have been announced by Continental Gin Co., Birmingham 2, Ala. Shown above is the welded steel wing-type self-cleaning pulley which assists in belt alignment by preventing build-up of material on the pulley face. The other line consists of crown- or straight-face welded-steel pulleys.

Non-Clogging Pumps

Western Machinery Co., San Francisco 7, Calif., has announced two new Torque-Flow pumps featuring recessed impellers that are reported to make the pumps completely non-clogging and highly resistant to abrasion. Type D is available with horizontal or vertical mounting in 4- and 6-in sizes for general duty pumping of solids, even at high heads and capacities. Type DL is a 4-in version of Type D for use on low head applications.



Crawler More Rugged

A number of improvements in the Model TC-12 crawler tractor have been announced by Euclid Div., General



Every dipper-full weighs 80 tons! The "River Queen", largest power shovel ever to come out of the Bucyrus-Erie shops, can move over 33,000 tons of earth and rock overburden in a single 8-hour day—enough to fill a freight train six miles long. The "River Queen" flies the colors of the River Queen Coal Company near Greenville, Kentucky, a joint strip-mining venture of the W. G. Duncan Coal Company and the Peabody Coal Company and operated by Peabody.

OKOCORD keeps the big ones digging!

She's a big one, all right. Towering as high as a 13-story building, tipping the scales at over twenty-four hundred tons, the "River Queen" is one of the largest pieces of mobile land machinery ever sent into action. And she's powered by a 3-inch, 3/c portable Okocord cable.

She's a hungry one, too! She gobbles up 55 cubic yards of dirt and crushed rock in every bite. She draws 4,160 volts of electricity from her Okocord cable to run the 15 huge electric motors that give her the muscle power to move, wheel and dig.

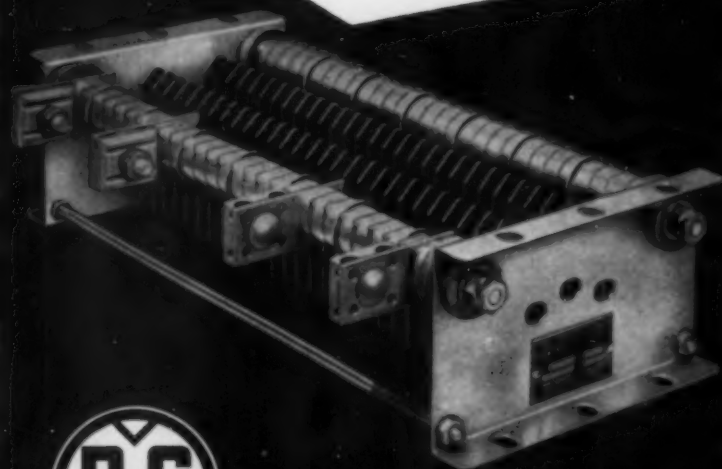
She needs that power every second—or two and a half million dollars worth of equipment is immobilized. That's why Okocord trailing cable was selected to stand up to constant reeling and unreeling . . . to twisting and scraping as it's dragged over rocky ground . . . to being left for days on end in water and muck.

You should know about Okocord, too, whether you operate the world's largest power shovel or a simple portable drill. It's so easy—just write for Bulletin A-1108, The Okonite Company, Passaic, N. J.



where there's electrical power...there's **OKONITE CABLE**

There is a
difference
in Resistors



Resistors have proved
this for many years

Different, because steel and mica, both extremely durable materials, coupled with P-G exclusive design produce a resistor of great mechanical strength. There is nothing to break. With accurate resistance values and adequate carrying capacities, P-G Resistors outlast ordinary resistors. Tell us your specifications and let P-G solve your resistor problem.

For any job . . . Where constant "trouble free" resistor service is wanted . . . you can safely specify P-G Steel Grid Resistors and get better performance with low cost maintenance.

The Non-Flexible Steel Grid Resistor



THE POST-GLOVER ELECTRIC COMPANY

OFFICE and FACTORY—Kenton Lands Road, Erlanger, Kentucky

MAILING ADDRESS—Box 709, Covington, Kentucky

Equipment News (Continued)

Motors Corp., Cleveland 17, Ohio. Most of the new improvements result in heavier, more rugged construction and simplified servicing, it is claimed. The 402-net-hp "Twin" crawler has been increased in weight from 64,000 to 67,000 lb, while an increase of 30% in the mechanical advantage of brakes is said to have been accomplished. A typical change is the replacing of four oil-bath air cleaners with two of the dry type.

Easily-Coupled Drill Steels

Atlas Copco, Paramus, N.J., has introduced Swedish Sandvik Coromant extension drill steel and bits to the U.S. market. The 1½- and 2-in cold-rolled extension steels are said to feature uniform strength, true circular flushing holes and 2-threads-per-in rope threading. A variety of lengths are available. The rope-threaded bits have tungsten carbide inserts and come in sizes to match the extension steel. Shank adapters are also available.

Equipment Shorts

VERTICAL ALL-WEATHER MOTOR

—Intended for outdoor operation under all weather conditions, the new Weather Protected Vertical Motor made by Louis Allis Co., Milwaukee 1, Wis., comes in ratings of 250 to 2,000 hp. It is reported to meet NEMA Type II specifications, and is made in both hollow and solid shaft models.

STORAGE PILE PROTECTION — A

new blend of water based synthetic polymers that forms a thin crust which is tough, durable and highly resistant to weathering has been developed by Johnson-March Corp., Philadelphia, Pa. When sprayed on storage piles of coal, the inert, unreactive and non-toxic chemical is noted as having no effect on the burning qualities, but forms a crust which lasts in excess of a year and reduces erosion of the pile by weather.

GEAR REDUCERS—A compact quad-

ruple reduction speed reducer, available in five sizes, said to produce ratios as high as 2,217:1, is now being offered by Link-Belt Co., Chicago 1, Ill. New larger sizes of double and triple reduction drives are also offered. Capacities exceeding 200 hp are made.

RIGID PLASTIC PIPE—Carlson Products Corp., Cleveland 14, Ohio, has

brought out a new rigid plastic pipe which they claim can be used at temperatures up to 180 F and at working pressures averaging 100 psi above those for other similar plastic pipe. Re-



Yieldable Arch provides 'safety valve' against squeezing pressures

As its name implies, the Yieldable Arch is designed to give under the squeeze of heavy ground, instead of suddenly letting go. This yielding action gives the overburden a chance to settle slowly into a natural arch around the drift or tunnel.

Each set of Yieldable Arches is made up of rolled U-shaped segments, heavily flanged to resist torsion. Segments nest into one another at the ends to form a sliding joint which is secured by U-bolt clamps. The clamps are drawn up tightly enough to create friction joints which hold fast under normal loads. But when pressures bear down, friction in the joints is overcome and the segments slide, thus acting as a sort of safety valve to keep the steel arch

from buckling or deforming under the crushing load.

Yieldable Arches are easy to install; no special tools or fancy equipment is needed. Your own men can set them up and take them down with only a minimum of supervision. And that brings up another important point: Yieldable Arches are usually recoverable for reinstallation elsewhere in the mine. They frequently pay for themselves within the first year of service. One of our engineers will gladly give you full details on the Bethlehem Yieldable Arch.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Equipment News (Continued)

ported immune to rust and most corrosion, the pipe, which comes in sizes $\frac{1}{2}$ through 6 in and pressure ratings from 100 to 500 psi, can be cut with a handsaw and jointed by solvent welding.

HIGHWAY TRUCK TIRE—A new truck tire, the Deep Cross Lug, made by General Tire & Rubber Co., Akron, Ohio, is reported to have a 60% deeper than normal tread. The Nygen carcass combined with a unique tread design is

noted to produce self-cooling and unequalled performance.

RAPID CABLE RETURN—Lug-All Co., Haverford, Pa., has introduced a cable return crank attachment which makes possible rapid return of cable to the drum for all of its portable winch-hoists. The compact attachment has a safety locking pin which shears if undue stress develops. Conversion kits are reported available.

LUBRICATION FITTINGS—Now available in a $\frac{1}{4}$ -in size are Keystone RT

lubrication fittings made by Keystone Lubricating Co., Philadelphia 32, Pa. The fittings are said to do away with conventional relief plugs, simplify lubrication of anti-friction bearings and cut lubricating time.

PROPULSION MOTORS—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., has added pump drive and propulsion motors to its line. Propulsion motors, for mounting on truck transmission housings, are reported available from one through 8.8 hp, 12 to 36-V DC. Pump drive motors for hydraulic systems range from one through seven hp, 12 to 36-V DC, usually battery powered.

WIRE ROPE THIMBLE—A large radius to minimize rope bending is said to highlight a new solid wire rope thimble made by American Hoist & Derrick Co., Fort Wayne, Ind. A steel casting, the thimble is available for all sizes of wire rope from $\frac{1}{2}$ to 1 $\frac{1}{2}$ in, for use with pins from 1- to 2 $\frac{1}{2}$ -in diameter.

CONTRACTORS' PUMPS—Worthington Corp., Harrison, N.J., has announced the addition of two new-size models of contractors' pumps, the 15M and 20M. Features are said to include a replaceable cast iron recirculation port that eliminates valves, constant-pressure automatic lubricator and hydraulically-balanced open impeller.

CONTINUOUS MOLDED HOSE—Quaker Rubber Div., H. K. Porter Co., Inc., Philadelphia 24, Pa., now has facilities in the East for producing continuous lengths of molded hose. They cite advantages of the hose such as uniform size and quality, absence of lead marks and availability in one-piece full-length reels.

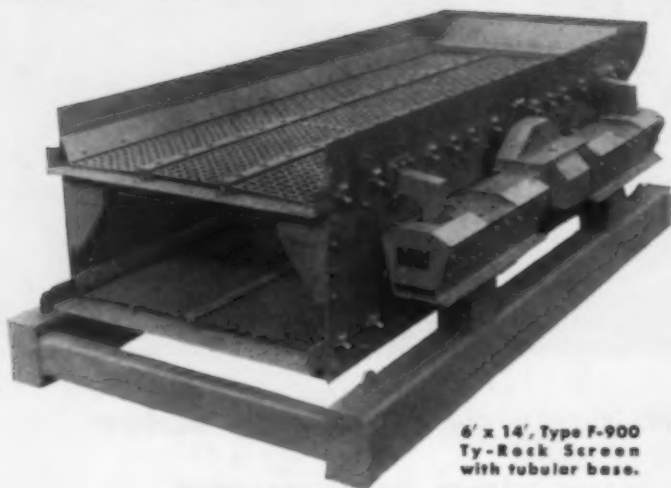
ALL-WEATHER CABS—Clark Equipment Co., Benton Harbor, Mich., offers a full line of all-weather cabs for many models of its Michigan line of tractor shovels, dozers and loggers. Reported to feature all-round visibility, all-welded steel construction and easy installation, the cabs protect the operator from wind, dust, rain, snow and cold.

Free Bulletins

TORQUE FLUID—A new illustrated folder from D-A Lubricant Co., Inc., Indianapolis 23, Ind., provides complete information on D-A torque fluid for use in automatic transmissions, torque converters and industrial machines.

FOUR TRACTOR BULLETINS—The following four bulletins are available from Caterpillar Tractor Co., Peoria, Ill. "Not an Element of Doubt," 8-p Book-

TY-ROCK SCREENS



6' x 14', Type F-900
Ty-Rock Screen
with tubular base.

For TOP Performance

The balanced circle-throw action of the Ty-Rock plus the full-floating action on large shear type resilient rubbers enables this screen to separate material with unequalled speed and effectiveness.

The Ty-Rock wastes no power in useless, harmful racking of buildings or supporting members. It delivers all of the intense power to the job of stratifying and separating the sizes.

Telephone HE 1-5400 • Teletype CV 586

THE W. S. TYLER COMPANY

CLEVELAND 14, OHIO

Manufacturers of Woven Wire Screens and Screening Machinery

ROOF BIT, AUGER TYPE

APT Style

Cuts clean, straight, on-gage holes fast in soft or medium formations; the strong braze protects tip.

**ROOF BIT, SOLID-INSERT**

PTV Style

New forging design for extra tip support; open body design for faster drilling.

**MACHINE BITS, CHISEL-POINT**

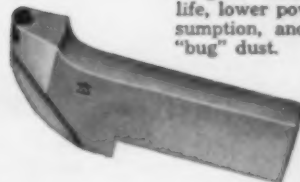
CCS-1, CC-3 Styles

Thicker, stronger cutting tips with extra steel support for the most rugged operating conditions.

**MACHINE BITS, FULL RADIUS**

CCA-1, CCH-6 Styles

Resist side wear and drag to increase tool life, lower power consumption, and reduce "bug" dust.

**MACHINE BITS, ENCLOSED TIP**

CCS-2, CC-11 Styles

The carbide tips, enclosed in steel, resist breakout . . . are held firmly by a combination of braze and mechanical holding.

**MACHINE BIT, NEGATIVE RAKE**

CC-8 Style

Cutting edge is stronger . . . receives greater support from increased lip angle. Tip, in compression, utilizes maximum carbide strength.

**AUGER BIT, MACHINE-MOUNTED**

AD Style

(Square and Hex Shank) Wide throat and stall-free design for top performance under all cutting conditions.

**AUGER BIT, HAND-HELD**

ADN Style

(Square and Hex Shank) Long, on-gage tip for clean, straight holes. "V" prong for faster penetration with less pressure.

**MINE-ENGINEERED
CARBOLOY BITS
REDUCE COAL CUTTING
COSTS**

**Carboloy mining tools cut more efficiently,
have long life . . . and are backed by
30 years of continuous carbide research**

General Electric mining tool engineers constantly study underground methods to supply you with tools that have the most efficient design for each mining operation. Each tool is tipped with Carboloy cemented carbide that has passed 29 separate control checks in the manufacturing process. You get uniform, completely dependable performance from every tool . . . and that means lower cutting costs per ton.

The full line of Carboloy mining tools is available for immediate delivery in every mining area. Your Local Authorized Carboloy Mining Tool Distributor has the right bit for every mining job. He will be glad to give you additional information or underground assistance. Or write: Metallurgical Products Department of General Electric Company, 11120 E. 8 Mile Blvd., Detroit 32, Michigan.

CARBOLOY
CEMENTED CARBIDES
GENERAL ELECTRIC

Equipment News (Continued)

let No. DE839, explains new oil filter improvements and servicing tips. Booklet No. DE840, 8-p "Hidden Elements," discusses quality features of Caterpillar mining machines in a variety of locations. Booklet No. D837, 8-p "Balanced Power . . . Matched to the Job," describes the D4, D6 and D8 tractors and illustrates how necessary it is to choose the right size one for a specific job. "Increase Power, Production, Profit," 12-p Booklet No. D841, shows the benefits of Caterpillar D8 and D9 tractors.

ROLLER CHAIN HANDBOOK—Link Belt Co., Dept. PR, Prudential Plaza, Chicago 1, Ill., has made available 154-p Book 2657 covering comprehensively all phases of roller chain engineering, from corrosion resistance of the metals and specifications of chains to a textbook of formulas, charts and diagrams for all applications.

DUST COLLECTORS—Ducon Co., Inc., 147 East 2nd St., Mineola, N.Y., offers 8-p illustrated Bulletin No. C-958 describing its high-efficiency cyclone dust collectors.

CONTINUOUS BORER—A 2-ft adjustable cutting height is featured by Type 425 Goodman continuous borer. Catalog G-136 gives dimensions, specifications, cutting and kerf patterns, and advantages of the machine. Write Goodman Mfg. Co., Halstead St. & 48th Place, Chicago 9, Ill.

ELECTRIC MINING CABLES—Western Insulated Wire Co., Los Angeles 58, Calif., offers a condensed catalog giving specifications and advantages of its Bronco 66 mining cables, engineered for tough use.

ELECTRICAL HARDWARE—Ohio Brass Co., Mansfield, Ohio, offers new 12-p Booklet No. 1396-H featuring all types of O-B insulators and hardware commonly used on electrical distribution systems, including recent additions to the line.

MAGNETIC SEPARATOR—A magnetic material reported up to 40% more powerful than ordinary permanent magnets is the heart of the Indox V drum separator described in 8-p Bulletin No. 1051 from Stearns Magnetic Products, 635 South 28th St., Milwaukee 46, Wis.

HOSE FITTINGS ADAPTERS—Catalog 4490 from Parker-Hannifin Corp., 17325 Euclid Ave., Cleveland 12, Ohio, presents an expanded line of adapters for reusable Hoze-lok fittings, including various styles of connectors for industrial hose.

LUBRICANTS—Keystone Lubricating Co., 3100 North 21st St., Philadelphia 30, Pa., offers 20-p Bulletin BK-19-a, entitled "Keystone Planned Lubrication," describing eight lubricants which cover about 50% of all industrial needs. Specifications, characteristics and uses are given.

HIGH VOLTAGE CONTACTORS—Airbreak contactors for applications up to 5,000 V are portrayed, along with specifications, in Bulletin 14B7303B from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Type 258A contactors are said to give reliable control of large motors.

TRACTOR DOZERS—"Michigan" Models 180, 280 and 380 tractor dozers made by Clark Equipment Co., P. O. Box 599, Benton Harbor, Mich., are described in a full-color 20-p catalog which is now available. Design and operating features are highlighted.

EARTHMOVERS—A new brochure describing its entire line of earth moving equipment has been released by Euclid Div., General Motors Corp., Cleveland 17, Ohio. Pictures and condensed specifications for the 24 models are included in Form 326R.



haulage capacity...

Place: Eunice, W. Va.
No. 8 Mine

Operator: Truax-Traer Coal Co.

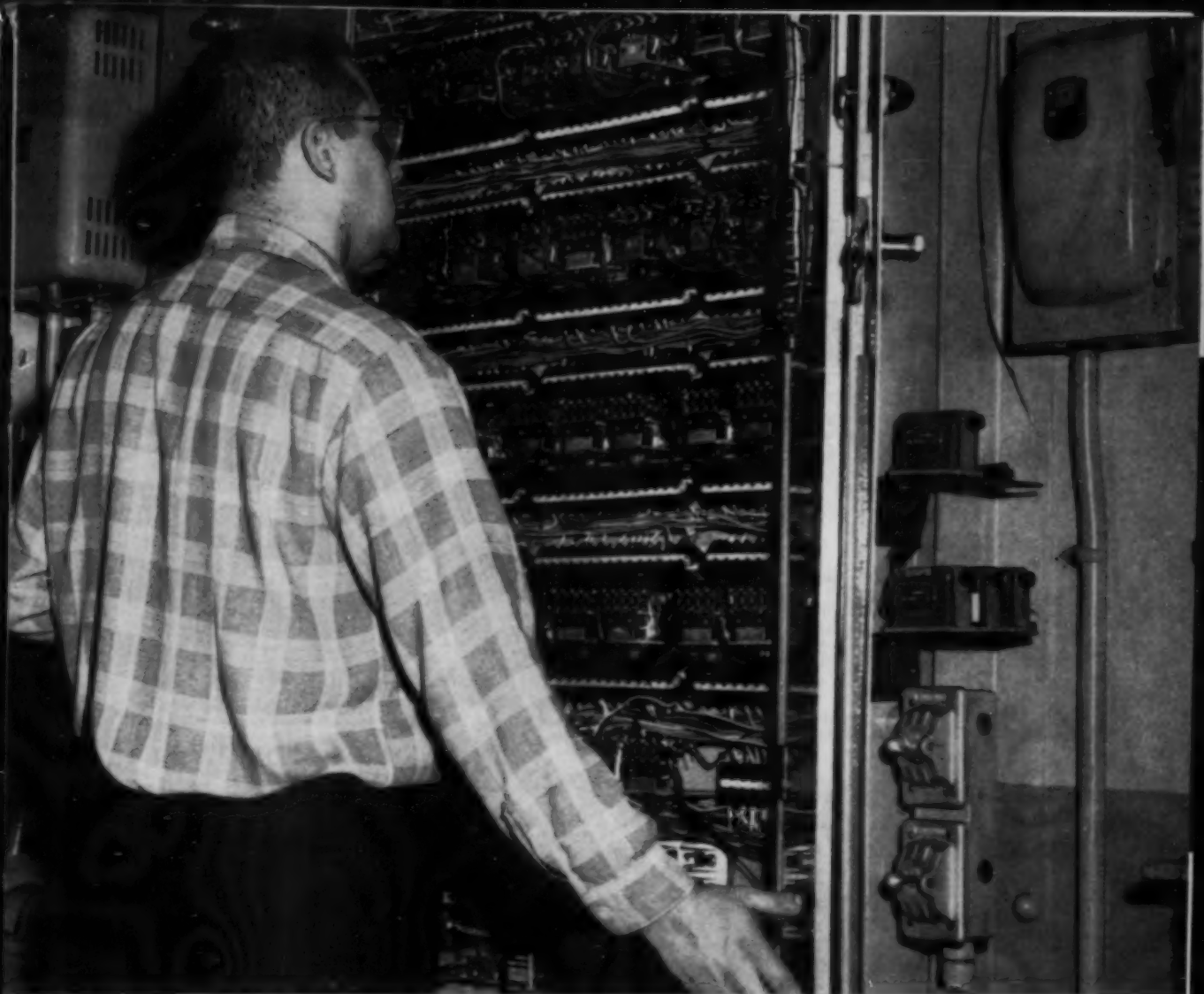
Car Dimensions: Length: 24' 6"
Width: 8'
Height: 24" (above rails)
Weight: 8600# (empty)

Capacity: 262 cu. ft. (level load)
392 cu. ft. (crown load)

where can you match it?

Since 1915 —
Pioneers in
haulage equipment





BEHIND THE SCENES at the new electronically controlled, fully automatic factory for making Du Pont Electric Blasting Caps (both regular and delay).

Automatic loading and electronic controls give you Du Pont Electric Blasting Caps that are even more reliable, more uniform than before

Let us take you behind the scenes at the world's most modern blasting cap plant. Then, you'll see why Du Pont Electric Blasting Caps, both regular and delay, are years ahead in reliability, uniformity and dependability.

Any possibility of human error has been completely erased from this scene. Every step in the process, from automatically loading the shell (and inspecting it 3 times during loading alone), to applying the shielded shunt and paper band is controlled electronically.

This revolutionary approach

means that every Du Pont electric blasting cap—regular or delay—*must* meet our rigid standards at *every step* or it will be automatically rejected by one of the dozens of electronically controlled "watchmen."

This elimination of the human equation means that all Du Pont

Electric Blasting Caps are even more uniform, more reliable, more dependable than ever before.

And you get all these benefits at **NO INCREASE IN COST**. Call your Du Pont representative or write to E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

DU PONT BLASTING CAPS



Products of Du Pont Research

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

WHY
DIDN'T I
ORDER KELLY
REPAIR PARTS?!!



You can save a lot of headaches on repairs to underground machinery by using KELLY parts. They last longer! Fully guaranteed and product insured.

KELLY MANUFACTURING CO.

MACHINE PARTS DIVISION
CHARLESTON 21, W. VA.



STEEL FABRICATING DIVISION
MIDDLEPORT, OHIO

Acme Mine Supply Co.
111 North Wabash
Chicago 2, Ill.

Central Supply Co. of Va.
Andover, Virginia

Kanawha Rail & Mach. Corp.
Charleston, West Va.

Kentucky Mine Supply Co.
Harlan, Ky.

Logan Mine Supply Co.
Logan, W. Va.

Mine Specialty Company
St. Albans, W. Va.

Ohio Valley Mine Supply
Huntington, W. Va.

Penna. & W. Va. Supply Corp.
Wheeling, W. Va.

Penna. & W. Va. Supply Corp.
Morgantown, W. Va.

Penna. & W. Va. Supply Corp.
Cowen, West Va.

TWO NOLAN RE-RAILERS with outstanding performance features!



Model DW Rerailer for Heavy-Duty Service

The standard rerailer for the industry, now being used by most railroads in America. The quickest, surest way to re-track cars, and steam and diesel locomotives. Will engage wheels at a greater distance from the rails than any other rerailers.

Any one size of Nolan Dry Rerailers can be used on 8 or more different rail sizes. Write for complete information.



Model SW Rerailer for General Service

This design has been in successful use by railroads for many years, for general service on steam and diesel locomotives, freight and passenger cars of all types. Clamps slide under rail, wedges driven down, and rerailer is locked tightly in place.



Two sizes of Nolan Model SW Rerailer are available. Write for prices.

THE NOLAN COMPANY
106 Pennsylvania St., Bowerston, Ohio

In most mining companies,
all key officials read **Coal Age**
because it helps them do a
better job

*If you're not a regular subscriber,
Mail this coupon TODAY*

COAL AGE, Fulfillment Manager,
330 West 42nd St., New York 36, N. Y.

Send me COAL AGE for 1 year at \$3 (U.S. and Canada only).

☐ Check enclosed ☐ Bill Company ☐ Bill me

Name _____ Position _____

Mailing Address: ☐ Home ☐ Business

City _____ Zone _____ State _____

Mining Company _____

Hdqs. or Mine Name _____

To Save Delay, Please Fill Out Completely

C958



This new Spencer improvement — shipping ammonium nitrate in sturdy polyethylene bags — now makes it possible to store oil filled bags without danger of leakage. Bags can even be stored out in the open for days!

Now! Ammonium Nitrate In Plastic Bags:

Revolutionary new polyethylene bags for Spencer Ammonium Nitrate end nuisance of leaking oil, slippery bags . . . help solve storage problems because they can be stacked outdoors.

Better than ever is the ammonium nitrate blasting process, pioneered four years ago by Spencer Chemical Company. That's because Spencer now offers you ammonium nitrate in heavy-duty polyethylene bags!

This new Spencer exclusive means that Spencer Ammonium Nitrate is easier to handle, easier to store.

Greater cleanliness is the first advantage these new bags offer. In the field it is common practice to add oil directly to the nitrate in the bag and then store it. This allows oil to soak into the nitrate and gives better results.

With paper bags, leakage often results. Bags get oily and soiled, making them hard to handle, and they have to be kept upright. With polyethylene bags, you can add oil through a small opening at the top

of the bag and then seal it up with tape! You can then stack bags in the normal manner without fear of leakage. Oil soaks into the mix, not into trucks or storehouse.

And unlike paper bags, waterproof polyethylene bags can be left in the open field—even during rainstorms! No need even to cover them up. And because they can be left in the open field, Spencer Ammonium Nitrate bags can solve critical problems of storage space.

Besides these exclusive bags, Spencer offers you free advice and service, giving you the full benefits of the knowledge and experience gained from its pioneer work in this field. Spencer's special bulletin, "Cut Blasting Costs with Spencer Prilled Ammonium Nitrate," is yours for the asking. Mail coupon today!



MAIL THIS COUPON:

Spencer Chemical Company
Sales Supervisor,
Industrial Ammonium Nitrate
401 Dwight Building
Kansas City 5, Missouri

- ☐ Please send me free Spencer bulletin, "Cut Your Blasting Costs with Spencer Prilled Ammonium Nitrate."
- ☐ Please have a Spencer Technical Service Representative call—without cost or obligation to me.

Name

Company

Address

Post Office State

Here's why it pays to bolt your roof

Among the Manufacturers

New Plant

The recently merged KW-Dart Truck Co. has announced the start of construction on its new 112,000-sq-ft building.

Located in Kansas City, the "\$1 million plus" plant will house both the general offices and manufacturing departments. The off-highway line of Kenworth Truck Div. of Pacific Car & Foundry Co. will be manufactured there,

along with other Kenworth-designed transportation equipment.

Preparation Men Meet

A large group of coal preparation men met in Pittsburgh recently at the invitation of Heyl & Patterson, Inc., contracting engineers.

The main purpose was to acquaint the men with the internal parts of the



Reineveld fine coal dryer and to demonstrate its ease of dismantling and reassembly. Demonstrations, such as the one shown above, were designed to prepare the men for future servicing requirements of their own machines.

National Mine Service Co. has moved its executive offices and has appointed a manager in its Equipment Division.

H. Hadley Merritt is the newly appointed service manager. Mr. Merritt will supervise all service work on National Mine TorKar, AC, DC and diesel shuttle cars. He has had wide experience in service work on mining machinery, having been associated with Joy Mfg. Co. and the Mining Div. of St. Joseph Lead Co. His office is in Ashland, Ky.

National Mine Service has moved from the Alcoa Building to new and larger quarters in the Koppers Building, in Pittsburgh.

Koehring Co., Milwaukee, Wis., has made two personnel appointments and has bought Ka-Mo Tools, Inc., Cicero, Ill.

Philip E. Cunningham has been named new product manager for the excavator line. He received a civil engineering degree from Marquette University in 1939, spent three yr in the army and then joined Koehring in 1946.

Edward R. Gee has been appointed district representative for the northeastern U. S. He has been connected with the construction industry for most of his adult life except for a WW II hitch in the Air Corps.

The purchase of Ka-Mo Tools, Inc., brings to Koehring a leader in the special earth drilling and boring equipment field. Ka-Mo will become a department of Kwik-Mix Co., a division of Koehring.

Robert J. Muth, former Los Angeles branch sales manager for Exide Indus-

**NEW SPEED AND DRILLING ECONOMY
WITH THE NEW IMPROVED**

Parmanco
MODEL CD-51-57

COAL AND CLAY DRILL



- Augers Rotated by Vickers 21.5 H.P. Fluid Motor with Hydraulic Feed Finger Tip Controlled
- Cutting Shield And Guide Completely Automatic
- Drill Powered By 65 H.P. Water Cooled Motor.

Jack Foehrer, Pit Foreman says

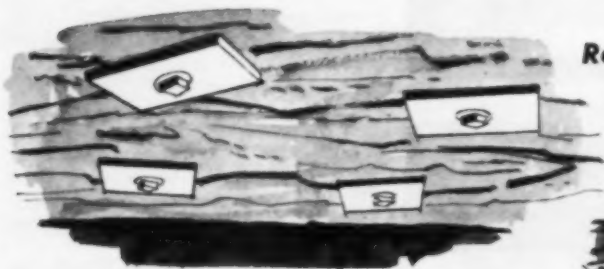
"THE PARIS DRILL IS THE BEST WE HAVE EVER USED."

SEND FOR COMPLETE DETAILS

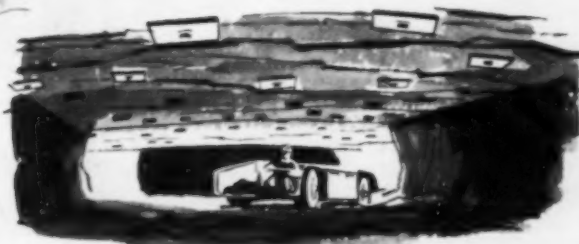
PARIS MANUFACTURING CO.

PARIS, ILLINOIS

Here's why it pays to bolt your roof



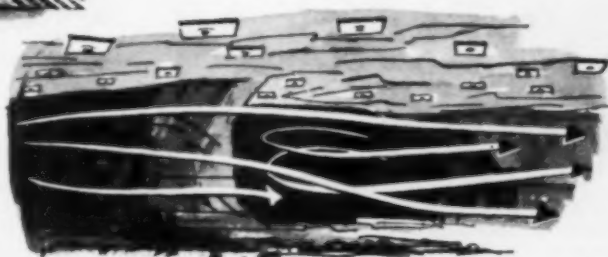
**Reduces rock falls . . .
improves safety**



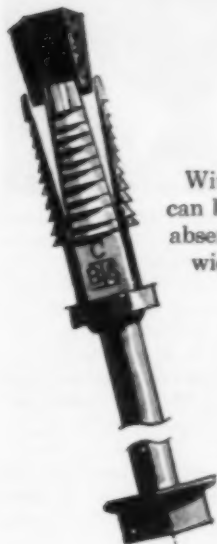
**Permits wide haulageways . . .
increases clearance**



**Makes mechanized equipment
easier to maneuver**



**Improves ventilation . . .
no bulky supports to store**



With roof bolting, mechanized equipment can be worked close to the face, due to the absence of bulky supports. In addition to permitting wide openings and clearances, roof bolting also improves ventilation . . . minimizes the need for storage space . . . eliminates fire hazards.

Bethlehem Headed Roof Bolts in 3 Diameters

To meet virtually every roof condition, Bethlehem makes headed roof bolts in 3 diameters: $\frac{5}{8}$ in., $\frac{3}{4}$ in., and $\frac{7}{8}$ in., having typical breaking loads of from 24,000 lb for the $\frac{5}{8}$ -in. bolt to 45,000 lb for the $\frac{7}{8}$ -in. bolt.

If you'd like to know more about roof bolting, write us at Bethlehem, Pa., and we'll have a representative call at your convenience.

SLOTTED BOLTS, TOO. For use in certain types of rock, Bethlehem also makes a 1-in. slotted roof bolt, which is used with a steel wedge. Ask for details.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL



Collyer PORTABLE CORDS AND CABLES FOR MINES...

for use on:

**Drills
Cutters
Loaders
Conveyors
Locomotives
Shuttle Cars**

... and all types of continuous mining equipment above and below ground.



Collyer

**INSULATED WIRE CO.
257 Pawtucket Ave.,
Pawtucket, R. I.**



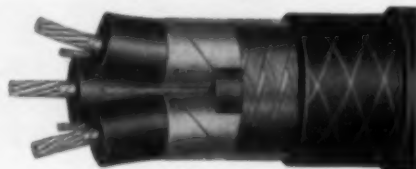
**Flat Twin Mining Machine Cable
(Types W & G)**



Locomotive Gathering Cable



**Portable Power Cable 2-4 Conductor Type G
2-6 Conductor Type W**



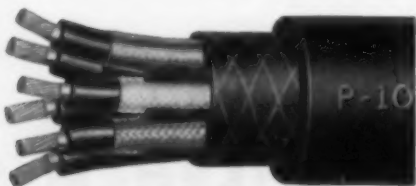
**Shovel Cables
(Classes A, B, C and D)**



Concentric Mining Machine Cable



Portable Cords (Types S, SO, SJ, SJO)



Remote Control and Drill Cords

Manufacturers (Continued)

trial Div. of Electric Storage Battery Co., has been appointed to the newly created position of field sales manager.

Starting with Exide in 1922, Mr. Muth worked up to the position of branch manager before assuming his present job, in which he will be responsible for all branch operations in the U. S.

A 10,000-sq-ft addition to the existing facilities of Flood City Brass & Electric Co., Johnstown, Pa., has been completed.

The addition consists of new offices and plant area for the 51-yr-old company.

Newcomer Products, Inc., Latrobe, Pa., has appointed a sales representative for Indiana, Illinois and western Kentucky.

Newcomer, manufacturer of NP controlled quality carbide and carbide mining tools, has appointed Cartwright-Crismore, Indianapolis, Ind., sales representative in the area.



Astor L. Thurman has been named manager of W. Va. Works, Connors Steel Div., H. K. Porter Co., Inc.

Mr. Thurman (above) has had engineering, production, management and sales experience in the metals industry. He joins Connors after having been executive vice-president of Mannesmann-Meer Engineering and Construction Co., Easton, Pa.

Frank V. Donaghue has been promoted to manager of truck tire sales for General Tire & Rubber Co.'s Philadelphia Div.

Formerly the Baltimore, Md., territory salesman, Mr. Donaghue has been associated with General Tire & Rubber Co. in various sales capacities for many years. During World War II he served in the Army Ordnance Corps, attaining the rank of Major. He is a graduate of St. Thomas Seminary.



SOLID STABILITY

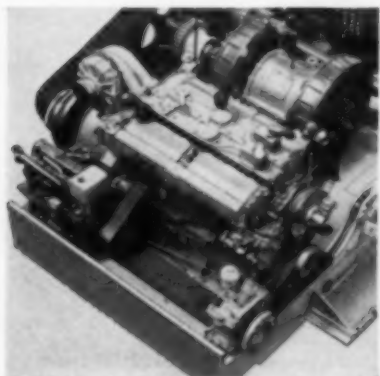
Look at this massive carbody and these long, wide crawlers! A solid base and a low ground bearing pressure of only 9.6 lbs. per sq. inch let you work right at the edge of a bank.

a quick guide to increased mining output with the Manitowoc 4500



DIRECT POWER FLOW

No one but Manitowoc gives you a slide pinion design that directs power straight to the "business end". Only gears that are working turn and there are only 15 gears in the entire unit!



UNIFIED POWER PACKAGE

The 4500 is diesel engine powered with the capacity to tackle any job. There are no fussy electric motors . . . no dead-weight . . . no delicate circuits.



GREATER MOBILITY

Your operator travels steep grades without "babying" his machine . . . there's no rocking when moving. Lets you mine anywhere! And fast between job moves can be made by rail or highway trailer.



HI-LIFT BOOM

A 60' Hi-Lift shovel boom and a 45' stick are available to give extra reach and height. Standard 120' dragline boom handles 6-yd. bucket . . . special 140' boom and 4-yd. bucket extends digging range.





HERRINGBONE

WIRE ROPE

New
Longer-Wearing
Pattern in
Wire Rope
Styles!

After three years of extensive field trials this, the newest of Roebling's wire ropes, is now ready to go to work for you on a service basis that will exceed that of *the wire rope you are now using*.

Roebling Herringbone* combines the best features of both regular and Lang lay rope constructions; being made up of two pairs of Lang lay strands and two strands of regular lay. The regular lay strands separate the two pairs of Lang lay strands. Thus, in one rope you have the superior flexibility and abrasion resistance of Lang lay and the greater structural stability of regular lay.

For the past three years, under all kinds of conditions, Herringbone has been used for general hoisting, holding and closing lines, shovel ropes, wagon scraper ropes and dragline ropes. The results have been wonderful . . . excellent flexibility, exceptional resistance to shock and abrasion, smooth, easy operation around drums and over sheaves, smooth spooling properties and structural stability unequalled by other rope for the same job.

There has never been a better time—or a wider need—for a wire rope that returns so much service for its cost. And, in addition to being a top performer on the job, Herringbone eliminates the necessity of stocking Lang lay for one purpose and regular lay for another.

You are invited to get in touch with your Roebling distributor or write Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey, for further and fuller details on the *investment* qualities of this new and highly serviceable rope.

*Reg. appl. for

ROEBLING

Branch Offices in Principal Cities • Subsidiary of The Colorado Fuel and Iron Corporation



PROFESSIONAL SERVICES

CONSULTING • PLANT DESIGN

RESEARCH • INSPECTION

LAND EXAMINATIONS • TESTING • APPRAISALS • MAPPING

NEWELL G. ALFORD

Consulting Mining Engineer

Coal Property Prospecting
Development, Operation and
Valuation

Oliver Building Pittsburgh 22, Pa.

HERBERT S. LITTLEWOOD

Consulting Electrical Engineer

Evergreen Hills

Irwin, R.D. 23, Penna.

ALLEN & GARCIA COMPANY

48 Years' Service to the
Coal and Salt Industries and Consultants
Construction Engineers and Managers
Authoritative Reports and Appraisals
232 S. Michigan Ave., Chicago
120 Wall Street, New York City

AMERICAN AIR SURVEYS, INC.

Registered Engineers
TOPOGRAPHIC MAPS FOR MINING
AERIAL PHOTOGRAPHS
907 Penn Ave., Pittsburgh 22, Pa.
Phone KEKpex 1-1888

GEO. S. BATON & COMPANY

"Founded 1909"

Consulting Engineers

Cost Analysis — Valuations
Mine and Preparation Plant Designs
1100 Union Trust Building Pittsburgh 19, Pa.

EAVENSON, AUCHMUTY & GREENWALD

Mining Engineers
COAL OPERATION CONSULTANTS
VALUATIONS

2728 Koppers Bldg. Pittsburgh 19, Pa.

THERON G. GEROW

Mining Consultant and Engineer

2033 Excelsior Blvd. Minneapolis 16, Minnesota

HOFFMAN BROS. DRILLING CO.

Drill Contractors Since 1902

Specialists in exploratory—grout holes and pressure
groutings. Also located in over 50 strategic areas for
prompt service. Free estimates.

164 Cedar St. Piquetteburg, Penna.

KIRK & COWIN, INC.

Ralph E. Kirk Percy G. Cowin
Registered Professional Engineers
Consulting—Reports—Appraisals
Mechanical Mining of Ore & Coal
Management and Construction of Mines
1-19th St., SW—Birmingham, Ala.
Phone SI 3-5566

K. PRINS AND ASSOCIATES

Engineers and Consultants

Coal Preparation—Layouts
and Construction Designs
Wellston, Ohio phone 4-3355-4-3393

DAVIS READ

Consulting Engineer

Layout — Operation
Modern Production Methods
Plant Design — Preparation
120 S. La Salle St. Chicago 3, Ill.

ROBINSON & ROBINSON

Consulting Engineers

Mine Operation—Preparation
Coal Property Valuation
Industrial Engineering

Union Bldg. Charleston, W. Va.

THOMPSON & LITTON

Consulting

Civil and Mining Engineers

Surveys • Examinations
Appraisals • Design
Inn Building, P. O. Box 517
Wise, Virginia
Telephone Wise 6215

PAUL WEIR COMPANY

Established 1898

Mining Engineers & Geologists
DESIGN AND CONSTRUCTION

29 North Wacker Drive Chicago 6, Illinois

J. W. WOOMER & ASSOCIATES

Consulting Mining Engineers

Modern Mine Systems and Designs
Foreign and Domestic Mining Reports
Oliver Building—Mellon Square, Pittsburgh, Penna.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT • BUSINESS
EQUIPMENT — USED OR
OPPORTUNITIES REALE

UNDISPLAYED RATE

(Not available for
equipment advertising)
\$1.50 a line, minimum 3 lines.

POSITIONS WANTED undisplayed rate is
one-half of above rate, payable in
advance.

Box Numbers—Count as one line.
Discount of 10% if full payment is made
in advance for 4 consecutive insertions.

DISPLAYED RATE

EQUIPMENT & BUSINESS
OPPORTUNITY
advertising \$12.50 per inch.
EMPLOYMENT OPPORTUNITIES—
\$21.00 per inch, subject to Agency
Commission.

An Advertising inch is measured 1/4" ver-
tically on one column, 3 columns—30
inches to a page

GERMAN FIRM

Excellent contact with coal mines. Would like to
introduce your lines of equipment.
Looking for: Representation, Import, License.
Write to:

RA-8605 Coal Age
Class. Adv. Div., P.O. Box 12, N. Y. 36, N. Y.

COAL RIGHTS

915 acres steam coal rights located in
Clay County, W. Va. for sale to settle
an estate. Estimated recoverable tonnage
of coal 10,043,040 tons. Ample supply
timber on purchasable property. Four rail
road miles from main B&ORR with state
highway through property. Analysis and
other pertinent information available from
C. A. Newcomb, Jr., 236 S. Spalding
Drive, Beverly Hills, Calif.

Proven COST REDUCTION PROGRAMS

for the Coal Industry

HELMICK & ASSOCIATES

9616 LAKE SHORE BLVD. CLEVELAND, OHIO

WANTED

Worn out or discarded
Conveyor Belting

Mines or dealers with accumulation
of scrap rubber belting write:

W-7462 COAL AGE

Class. Adv. Div., P. O. Box 12, New York 36, N. Y.

"FASTER
FROM FOSTER"
RAIL

& ALL TRACK EQUIPMENT

Nation's Largest Warehouse Stocks

L.B. FOSTER CO.

PITTSBURGH 30 • ATLANTA 8 • NEW YORK 7
CHICAGO 4 • HOUSTON 2 • LOS ANGELES 5

(Auction Advertising—page 94)

WE'RE SURE WE HAVE THE EQUIPMENT YOU NEED LET US PROVE IT

We are very proud to announce the recent purchase of the Black Mountain Mine, located in the heart of the Kentucky Coal Field. A partial listing of this equipment is included on this page.

CONVEYORS

- 883'-48" Belt Conveyor, Complete
- 1,500'-648" Jeffrey, 36" Belt Conveyor Structure
- 500'-36" Joy Limboller Belt Conveyor complete unit, Like New
- 1,000'-36" Joy Belt Conveyor, Complete
- 0'-36" Joy Belt Drive, Complete
- 2,000'-36" Barber Green Belt Conveyor
- 1'-36" x 150' Belt Conveyor
- 4'-1000' centers, 97HC Goodman Belt Lines, complete w/ Drives, Belt, Etc.
- 3'-MTB 30" Belt Conveyors, 1000' centers complete w/ Tandom Drives, Structure, Etc.
- 1'-MTB 30" Belt Conveyor Drive
- 21 h.p., 250 V. D.C., complete with controls
- 4'-20-575 30" Goodman Belt Conveyors complete with 250 V. D.C., 40 h.p. Drives, Structure and Belting, Excellent Condition
- 1'-Goodman Tandom 40 h.p. Drive, 30" w/ 1000' Goodman Rope Structure, complete with Belting and all appurtenances
- 3'-40 h.p., 250 V. D.C. Goodman Tandom Belt Conveyor Drive for 30" Conveyors, Excellent
- 0.000'-30" Jeffrey 32B Structure
- 1,500'-30" Barber Green Structure
- 2'-30" Belt Drive of various types
- w/ 15 h.p. Motor and Controls
- 0.000'-36" Joy Belt Conveyor
- 1,000'-30" Jeffrey 32B Belt Conveyor
- 15'-20" Belt Drive of various types
- 500'-24" Goodman Belt Conveyor, Complete
- 15'-20" Joy Chain Conveyors, Permissible
- 13'-15" Long Chain Conveyor, 350' centers complete w/ 600 DBM Long mobile head drive, 25 h.p. Motor, 250 V. D.C., Cat mounted
- 15'-15" Joy Chain Conveyors, Permissible
- 15'-15" & 12" GIEW, GING, G1W & G1AM Jeffrey Chain Conveyors
- 0-0125' Goodman Shakers, complete w/ 10', 21 P.A.
- 50'-0125', G1S & G20 Goodman Shakers
- 3'-P12 Long Piggyback Conveyors
- 31'-Goodman Power Dorkhills, Model 477
- 3'-P710 Long Piggyback Conveyors, Late Type
- 10'-PT15-8 Long Piggybacks with 5 h.p., 250 V. D.C., w/ 500' Centers
- 2'-610W Jeffrey Face Conveyors, complete

TRACKLESS EQUIPMENT

- 5-Long 88 Pig Loaders
- 2-200U-3E Joy Loaders, 250 V. D.C.
- 1-148U-8AE Joy Loader, Perfect
- 1-148U-7RAE Joy Loader
- 1-148U-7RAE Joy Loader, 250 V. D.C.
- 2-148U-3PE Joy Loaders, 250 V. D.C.
- 1-148U-2E Joy Loaders, 250 V. D.C., 28" O.H.
- 1-128U-9E Joy Loader
- 2-88U Joy Loaders, Rebuilt
- 2-Movers Whaley, 25 Loaders
- 4-48C Shuttle Cars, Elevating Discharge
- 7-48C, 6E and 3EX Joy Shuttle Cars, matched pairs, elev. brakes, elevating discharge
- 2-48C Joy Shuttle Cars
- 1-36C Joy Shuttle Cars, Matched Pair
- 1-50C Joy Shuttle Cars, Elevating Discharge
- 6-52D Joy Shuttle Cars
- 4-37E Joy Shuttle Cars
- 3-32E18 Joy Shuttle Cars, Rebuilt
- 1-32E18 Joy Shuttle Car
- 6-42E18 Joy Shuttle Cars, Matched Pairs
- 1-T2-2E and 3E Joy Cat Trucks
- 2-Joy Elevators, PL11-7PE and SPE
- 2-Arms Self Propelled, 40 h.p. Air Compressors, Permissible
- 1-60 h.p. Acme, 210 CFM Compressor
- 1-WK29 Sullivan Air Compressor
- 2-240 cu. ft. WK-83 Joy Compressors, rubber mounted, self-propelled, 30" O.H., Excellent
- 1-210 cu. ft. Acme Compressor, on rubber
- 2-125 cu. ft. WL-82 Sullivan Compressors, rubber mounted and self-propelled

- 5-Joy T12 Supply Hoops, Battery, complete w/ Batteries & Chargers
- 2-MSA Bantam Hook Dusters on tires
- 1-300 Goodman Loader, Rubber mounted
- 1-C253 Joy Coal Drill, Perfect
- 1-T1 Joy Cat Truck
- 3-Joy T2-5 Cat Trucks
- 1-RBD 30 CP Roof Bolting Drills
- 11-Mantex Jeps with 91 Motors

TIPPLE EQUIPMENT

- 2-Complete Tipples, including Cleaning Plant, Conveyors, Crushers, Bins, Etc.
- 3-American Air Tables for Stoker and Carbon
- 1-4 Coll Jeffrey Baum Jig Washer
- 1-CMI Coal Dryer, 40", Excellent
- 1-Heat Dryer-Complete
- 1-Merion Double Roll Primary Crusher
- 1-34" x 30" Pa. Single Roll Crusher
- 1-30" x 30" Double Roll Crusher
- 1-34" x 30" Double Roll Crusher
- 1-34" x 34" Single Roll Crusher
- 1-34" x 20" Jeffrey Flextooth Crusher
- 1-34" x 34" Jeffrey Single Roll Crusher
- 1-18" x 12" Jeffrey Pulverizer
- 1-3" x 14" Deeb's Donk Vibrator
- 1-3" x 12" Double Donk Vibrators
- 1-3" x 8" Low Head Vibrator
- 1-Jeffrey Traylor Vibrator Feeders
- 1-Jeffrey Traylor Vibrator Screens
- 1-Magnetic Separator, Complete
- 1-Set Jeffrey Deaerating Screens
- 1-MI Pressure Oil Spray
- 8-Rapport Conveyors, of various sizes
- 15-Tipple Belts from 15" to 42" width
- 1-10' x 42" Loading Boom
- 4-Loading Booms with Hoists
- Air Valves, Blowers, Pumps, New Screens, Parts for CMI Dryers, Speed Reducers, Feeders & Many other parts for Tipples

RAIL AND WIRE

- 4,710-Tons 16, 20, 30, 40, 50, 60, 70 & 80 lb. Re-vised Rail
- 63,000'-600,000 CM Copper Feeder Cable
- 270'-600,000 CM Copper Feeder Cable
- 15,500'-750,000 CM Insulated Copper Feeder Wire
- 38,550'-500,000 CM Insulated Copper Feeder Wire
- 17,000'-350,000 CM Rubber Covered Copper
- 48,000'-4/0 Stranded Wires
- 60,000'-4/0 Rubber Covered & Insulated Copper
- 70,000'-6/0 Trolley Wire
- 30,000'-4/0 Trolley Wire
- 60,000'-2/0 Solid Copper Trans. Line
- 10,500'-24 Transmission Wire
- 205,500'-02 Solid Copper Transmission Line

SUB STATIONS & TRANSFORMERS

- 1-500KW G.E., MG Set
- 2-300KW MG Sets, Allis Chalmers
- 5-200KW M.G. Sets, G.E.
- 5-200KW M.G. Sets
- 2-200KW, GE HOCB, 2300/4000 Volt Rotary Converters
- 13-150KW M.G. Sets of various makes and primary voltages
- 1-150KW Rotary Converter-Completely Automatic
- 1-150KW Motor Generator Set
- 1-100KW UD24 International Diesel, w/250 volt DC Generator
- 1-100KW Buick Diesel, w/250 Volt Generator
- 2-100KW Motor Generator Sets
- 1-100KVA Gasoline Generator Unit
- 2-50KW M.G. Sets, 125 V. D.C., 1200 RPM
- 2-G.E. Sets, 250 & 200 440 V. A.C.
- 2-Armatures for 150 & 200KW Rotary
- 2-400 & 800KW Auto Transformers
- 175-Transformers from 5 KVA to 500 KVA

MINE CARS

- 38-30" t.g. Drop Bottom Cars
- 23-42" t.g. End Dump Cars, Various makes
- 22-42" t.g. ACF, 6 Ton Drop Bottom Cars
- 33-44" t.g. Drop Bottom Cars, 10 Ton
- 17-50" t.g. Drop Bottom Cars, various sizes
- 505-44" End Dump Cars, various makes
- 348-48" t.g. S.O. Drop Bottom Cars, 22" O.H.
- 134-ACF Drop Bottom Mine Cars, 34" O.H.

LOCOMOTIVES

- 1-40 Ton Shary Locomotive with 50 1/2" t.g.
- 2-20 Ton MH77 Jeffreys, 42" t.g.
- 1-15 Ton Westinghouse Locomotive, unit no. 1443, 38" O.H., 90 h.p. units, pneumatic brakes, trolley pole and controls, 48" t.g.
- 1-15 Ton MH220 G. E. Locomotive, 90 h.p. units, 44" O.H., 48" t.g., Excellent
- 15-15 Ton Locomotives, 250 Volt, any gauge
- 3-12 Ton 25B Goodman Locomotives, 40" O.H.
- 1-10 Ton Locomotives, 250 Volt, any gauge
- 14-8 Ton Locomotives, 250 Volt, any gauge
- 1-7 Ton Jeffrey
- 9-7 Ton Atlas Battery Locomotives
- 1-6 Ton Battery Locomotive-New
- 53-6 Ton Locomotives, any gauge
- 4-2 Ton Jeffreys, MH150 Locomotives
- 3-4 Ton MH28 Jeffrey Locomotives
- 1-5 Ton Locomotive, 250 Volt
- 12-4 Ton Locomotives, 250 V., any gauge
- 6-4 Ton SCSA G.E. Battery Locomotives
- 1-3 Ton Locomotive, 250 Volt

CUTTING MACHINES

- 7-7AU and 7B Trunk Mid. Sullivans
- 16-18 Sullivans, 35 & 50 h.p.
- 5-12AB & 12AA Standard Goodmans
- 2-33L Jeffrey Cutting Machines, 250 V. D.C. with 7 1/2" and 8 Bars
- 3-12AA Universal Goodmans
- 6-212AA Baby Goodmans, 250 Volt
- 1-212G3 Baby Goodman, 220 440 V.
- 14-312 and 712 Goodmans, w/ Bugbusters
- 1-624 Goodman, 42" t.g.
- 1-20U Jeffrey, 250 Volt
- 1-20U Jeffrey, 220-440 Volt, A.C.
- 46-62B & 158B Jeffreys, AC & DC Bugbusters & Trucks available

MISCELLANEOUS

- 7-HKL Brown Fayre Car Spotters
- 2-CH Sullivan 5 h.p. Car Spotters
- 1-HKI Brownie Layer Loader Hoist
- 90-Hoists, from 5 h.p. to 800 h.p. of various specifications
- 111-Pumps from 1/2" to 4500 GPM of various specifications
- 1-10 h.p. Deming Deep Well Pump
- 1-330 GPM 6" Farnes Deep Well Pump
- 1-4" Centrifugal Slurry Pump w/ 15 h.p. Motor
- 1,000'-2" Plastic Pipe
- 7,000'-8" Sack Pipe
- 33,500'-4" Sack Pipe
- 83-Miner Fans from 30" to 6' MI Pressure
- 264-Coal Grills, 371 CP, 372 CP, 373 CP, 473 CP, A3 and A7 Jeffrey
- 3-Sullivan Jumbo Drills, track mounted
- 1-WK29 Sullivan Air Compressor, 120 cu. ft. capacity, 48" t.g.
- 1-WK30 Compressor, track mounted, self-propelled, 120 cu. ft. capacity, 48" t.g.
- 2-Controll Compressors, 120 cu. ft. capacity, 48" t.g.
- 1-Castine Truck Cleaner, presently 48" t.g.
- 6-Cleveland Stoppers
- 13-Scales for Mine Trucks and Trucks
- 22-Air Compressors of various sizes
- 6-Dozers: D4, D6, D7, D7D & TD14A
- 12-Hook Dusters up to 30 h.p., track and rubber mounted
- 1400-Edison Lamps, Model P & B4
- 37-Auto Starters from 3 h.p. to 100 h.p.
- 1-Dust Collector for underground use

ALL INQUIRIES WILL BE ANSWERED PROMPTLY—Call, Write or Wire us, Day or Night

ELECTRIC & MACHINE SUPPLY COMPANY

MINING AND INDUSTRIAL EQUIPMENT

WHITESBURG, KENTUCKY
Box #610, Ph. #2223 TWX #8249
NIGHT PHONES—2234 or 2347

BILL CONLEY, LEONARD NEASE

MELVIN ADAMS

CLARKSBURG, WEST VA.

Box #227, Ph. #Me 3-0253 TWX #C859
NIGHT PHONES VI 2-2776 or MA 2-6338

HANK UBBING, GORDON STAFFORD



SAVE ON YOUR
ROLLERS • CHAINS
SPROCKETS • IDLERS, ETC.

for Caterpillar—
International—Allis Chalmers
BRAND NEW—GUARANTEED
SEABOARD EQUIPMENT CO., INC.
161-12 Jamaica Avenue
Jamaica 32, New York
AXtel 7-4422

FOR SALE

- 1-Jeffrey Rope & Button Conveyor 1 1/4" Rope, 800 feet centers
- 1-Set Jeffrey Shaking Screens 4' wide, Self contained unit.
- 3-Jeffrey Loading Booms complete with drive and hoist.
- 1-Thew-Lorain Shovel Front with one half yard dipper.

S. B. McCLUNG, INCORPORATED

P. O. Box 1596

Williamson, W. Va.
Telephone 1010

PROFIT SHARING FOR EVERYBODY!

We share our profits with those from whom we buy and to whom we sell, by passing on the savings of a large-scale, diversified operation. That's why we pay year round fair prices for any kind and quantity of mining equipment from one item to a complete mine anytime. That's why we guarantee coal operator's an unfailling source of the best in mining equipment at the lowest prices always!

WE BUY SELL TRADE

JOY EQUIPMENT—REBUILT

- 3-Jay 14-BU Loaders, low pedestal, 7AE.
- 2-Jay 14-BU Loaders, medium pedestal, 7BEE.
- 1-Jay 14-BU Loader, high pedestal, 7BE.
- 2-Jay 12-BU Loaders, 9E, latest type.
- 1-Jay 12-BU Loader, 220 volt AC.
- 1-Jay 11-BU Loader, latest type.
- 2-Jay 8-BU Loaders, 250 volt DC.
- 1-Jay 8-BU Loader, 34" overall height.
- 2-Jay 8-BU Loaders, 220 volt AC.
- 1-Jay curved Bar Head, complete.
- 6-Reliance 38-J Motors, 10 H.P.
- 6-Reliance 24-J Motors, 7½ H.P.
- 4-Reliance 10-J Motors, 3 H.P.
- 28-9-J Motors, 4 H.P.
- 6-New Wheel Units for Jay 65C Shuttle Cars.
- 1-Goodman 660 Loader on cats, excellent.
- 1-Goodman 445 Loader on cats, latest type.
- 2-Jay 85C Shuttle Cars, rebuilt.
- 1-Jay 65C Shuttle Cars, rebuilt.
- 2-Jay 55C Shuttle Cars, rebuilt.
- 2-Jay 22E9 Shuttle Cars.
- 2-Jay 22E10 Shuttle Cars, rebuilt.
- 2-Jay 22E11 Shuttle Cars, rebuilt.
- 1-Jay 22E16 Shuttle Car, rebuilt.
- 2-Jay 42E16 Shuttle Cars, rebuilt.
- 3-Jay CD-22 Drills, like new.
- 4-Jay T-2-5 low pan Cat Truck.
- 1-Jay T-2-6 low pan Cat Truck with reel.
- 2-Jay T-1 Standard Cat Trucks, 220 AC.
- 2-Jay T-1 Standard Cat Trucks, 250 DC.
- 2-Jay 11-8 Cutting Machines, like new.
- 1-Jay 7-8 Cutting Machine, like new, 250 volt DC.
- 2-Jay 7-8 Cutting Machines, 220/440 volt AC.
- 1-Goodman Machine on Cats, 31" high. All hydraulic.
- 6-Goodman 512 Machines with Bugdusters.
- 1-Goodman 512 Cutting Machine, perfect.
- 4-Goodman 512 Cutting Machines, 220/440 volt AC.
- 3-Goodman 112 Cutting Machines, 220/440 volt AC.
- 1-Lee Horse low vein Machine Carrier on rubber.
- 2-Jeffrey 70 URB's, rubber-tired Cutters, Universal head, perfect condition.
- 1-Jay 10RU Rubber Tired Cutter, first class.
- 1-Jay 11RU Rubber Tired Cutter with bugdusters, Universal head, like new.
- 2-Jeffrey 29UC Cutting Machines, Universal head, cuts anywhere in boom, 38" high, on cats, 250 volt DC.

LOCOMOTIVES

- 2-Jeffrey 13 ton, type MH-110, 36", 42" and 44" Ga.
- 2-Jeffrey 10 ton, type MH-110, 42" and 44" Ga.
- 1-Jeffrey MH-124, 6 ton, 24" overall height.
- 12-Jeffrey, 6 ton, type MH-88, 42", 44" and 48" Ga.
- 2-Jeffrey, 8 ton, type MH-100, 2" armor plate frames.
- 1-Jeffrey, 6 ton, type 2186, 22" above rail.
- 3-Jeffrey, 4 ton, type MH-96, 42", 44" and 48" Ga.
- 1-G.E., 4 ton, type 825 Locomotive, 22" high, 42", 44" and 48" Ga.
- 10-G.E., 6 ton, types 901, 903, 821 Locomotives, 42", 44" and 48" Ga.
- 1-G.E., 8 ton, type 822 Locomotive, 44" Ga.
- 3-G.E., 10 ton, type 809 Locomotive, 42", 44" and 48" Ga.
- 2-Goodman, type 33, 6 ton, 44" and 48" Ga.
- 3-Goodman, 8 ton, type 32A, 36", 44" and 48" Ga.
- 3-Westinghouse, type 902, 4 ton, 42" and 48" Ga.
- 2-Westinghouse, type 904, 6 ton, 44" and 48" Ga.
- 2-Westinghouse, type 906, 44" and 48" Ga.
- 2-Westinghouse, type 907, 10 ton, 44" and 48" Ga.
- 8-Jeffrey MH-78 Locomotive Units, cheap.
- 3-Plymouth Diesel Locomotives, 8 and 10 tons, 42" and 44" Ga.

LOCOMOTIVES (Cont.)

- 4-Jeffrey MH-88 Locomotive Units, reel bargains.
- 6-Jeffrey MH-100 Locomotive Units, reasonable. Locomotive Trucks and Spare Armatures for all the above.

TIPPLE EQUIPMENT

- 1-Coder Rapids portable super Screening Plant.
- 1-Complete 5 track tippie with washer.
- 1-Allis Chalmers 5'x14' Rippla Vibrator.
- 1-5'x14' Robins double deck Vibrator.
- 1-4'x10' Robins Gyrex Vibrator.
- 1-Roberts & Schofer tandem Hydro-Separator.
- Belt Loading Booms.
- 1-Robins Car Shakeout.
- 10 Crushers, various sizes.
- Feeders, Drag Conveyors and Loading Booms.

CUTTING MACHINES

- 1-Jay 11RU, rubber tired, Cutter.
- 1-Jay 10RU, rubber tired, Cutter.
- 2-Jeffrey 70 URB Cutters, rubber-tired, Universal Head, low vein.
- 3-Jeffrey 29UC Universal Machines on Cats.
- 1-Goodman on cats, 31" overall height.
- 3-Baby Goodman 212's, rebuilt, 250 volt DC.
- 1-Baby Goodman 212, rebuilt, 220 volt, 3 phase AC.
- 1-Goodman 312, 18" high.
- 6-Goodman 512's with Bugdusters, like new.
- 4-Goodman, 512's, rebuilt, or as removed from service.
- 4-Goodman 512's, 220/440 volt AC.
- 3-Goodman 112's, 220/440 volt AC.
- 1-Jeffrey 35-L Cutting Machine, 220/440 volt AC.
- 2-Jay 7-8 Cutting Machines, 220/440 volt AC.
- 2-Jay 118 Cutting Machines, rebuilt.
- 6-Goodman 12AA's and 112AA's, 250 volt DC.
- 2-Goodman 324 Slabbers.
- 2-Goodman 724 Slabbers.
- 6-Jeffrey 35L's, like new, 17" high.
- 2-Jeffrey 35L's, on low vein trucks.
- 1-Jeffrey 35L, 220 volt AC.
- 13-Jeffrey 358's and 3588's.
- 2-Jeffrey 29B's on truck.
- 2-Jeffrey 29C's truck mounted.
- 1-Jeffrey 29L on truck, perfect.
- 2-Sullivan CR-10's, 15" high.

LOADING MACHINES

- 16-Loaders, all types.
- 2-Jeffrey 61 CLR's on rubber, 26".
- 3-Jeffrey L-500 Loaders.
- 2-Myers Whaley No. 3 Automat Loaders.
- 2-Clarkson Loaders, 26" above rail.

CONVEYORS

- 1-Jeffrey 52-B, 30" Conveyor, 1000'. Excellent.
- 4-Jay 30" Underground Belt Conveyors, 500' to 2000' each. Excellent.
- 1-Barber Greene 30" Belt Conveyor, 1000'. Excellent.
- 1-Robins 30" Belt Conveyor, 1000'.
- 1-Jeffrey 52-B, 26" Conveyor, 1200' each.
- 3000' Conveyor Belt, 30".
- 2-61EW Elevating Conveyors.
- 2-41WM 15" Room Conveyors, 300'.
- 2-Jay 15" Room Conveyors, 300'.
- 2-Jay 28" Conveyors, 300'.
- 4-Jay Ladel UN-17 Shakers.
- 10-Goodman G-12½ and G-15 Shakers.
- 2-Long 400 DBH 15" Chain Conveyors, 25 H.P. Motors, new.

CONVERTERS AND DIESEL PLANTS

- 1-300 KW Westinghouse Portable Rectifier
- 2-100 KW, G.E. TCC-6's, 275 volt, Rotary Converter.
- 1-150 KW, G.E. HCC-6, 275 volt, Rotary Converter.

CONVERTERS AND DIESEL PLANTS (Cont.)

- 1-150 KW, 6 phase, Allis Chalmers Rotary Converter, 275 volt DC, perfect.
- 1-200 KW Allis Chalmers Rotary Converter, 6 phase, 275 DC, perfect.
- 1-200 KW, G.E. HCC-6 Rotary Converter, 275 volt DC.
- 3-300 KW, G.E. HCC-6 Rotary Converters, 275 DC.
- 3-300 KW Westinghouse, 6 phase, Rotary Converters, 275 volt DC.
- 1-375 KW Westinghouse Rotary Converter, 275 volt.
- 2-500 KW Westinghouse Rotary Converters, 275 volt DC.
- 1-200 KW Westinghouse Rotary Converter, 275 DC.
- (all the above with 6900/13000 and/or 2300/4000 primary transformers)
- 2-150 KW MG Sets, General Electric and Westinghouse.
- 1-200 KW MG Set, Westinghouse, rebuilt.
- 1-200 KW MG Set, General Electric, perfect.
- 2-150 KW Allis Chalmers MG Sets, 275 DC volt, excellent, 220-440 AC volt.
- 1-300 KW Westinghouse, 600 volt MG Set, rebuilt.
- 2-300 KW Westinghouse, 600 volt, 6 phase, Rotary Converters.
- 4-500 KW Westinghouse, 600 volt, DC, 6 phase, Rotary Converters.
- 2-500 KW HCC-6 Rotary Converter, 6 phase, 400 volt DC.
- 1-Cummins 125 KW, Diesel with 250 volt DC Generator.
- 1-G.M.C. Diesel Plant with 60 KW Generator, 275 volt DC.
- 1-Allis Chalmers Natural Gas Engine with 100 KW Generator, 275 volt DC.
- 1-700 H.P. Shaft Hoist, complete.
- Complete steam plant, will sell all or any part. Boilers, like new, 1100 H.P. and 300 H.P. Also transformers, turbines, etc.
- 1-Complete Tippie with Cleaning Plant.

MISCELLANEOUS

- 4-All Steel Armac Buildings, various sizes.
- 28-Jeffrey Molyvans on rubber tires.
- 1-¾ Yard Shovel and Back-Hoe.
- 1-¾ Yard Crane on Cats.
- Battery Supply Tractors, rubber tired.
- 1-Centrell Air Compressor on rubber tires.
- 10-Air Compressors, 1 H.P. to 40 H.P.
- 2-Jay self propelled rubber tired compressors, 240 cu. ft.
- 2-Acme self propelled rubber tired compressors, 130 cu. ft.
- 40 Mine Pumps, all types.
- 1-Differential 40 Passenger Man-Trip Car.
- 6-MSA Rock Dusters.
- 2-Phillips Carriers, 44" and 48" Ga.
- 2-Barber Greene self propelled Bucket Elevators.
- Pipe, Plastic, Steel, Transit, all sizes 1" to 6".
- 100 Mine Cars, drop bottom, 42" Ga.
- 30 Mine Cars, drop bottom, 44" Ga.
- 100 Mine Cars, 18" high, and dump, 44" Ga.
- 300 Mine Cars, and dump and drop bottom, 20" high, 48" Ga.
- 1-10 ton Mine Car Scale with Recorder.
- 15-Brown Fayre HXL and HG Car Spotters.
- 1-12 ton Differential Slate Lorry.
- Incline Hoists, 25 to 50 H.P.
- 1-Jeffrey 6' Aerodyne Fan.
- 1-Jeffrey 8' Aerodyne Fan.
- 2-Storage Tanks, 4,000 Gallon.
- 10,000 Five Gallon G. I. Cans, screw lids.
- 800 tons Relaying Rail 25" to 80".
- 10 tons Copper Trolley and Feeder.
- 300 Transformers from 1 to 2,000 KVA, 110 to 13,000 primary volts.
- 400 Electric Motors, 3 to 250 H.P.
- Huge stock of mine supplies.
- Thousands of Other Items.
- 600-MSA Mine Lamps, Chargers, etc.
- 1-Frike Saw Mill-Complete.

We Own What We Advertise

J. T. FISH

PHONE 2825

LOGAN, W. VA.

RAVEN MINING EQUIPMENT COMPANY

Good Used Equipment — Priced to Save You Money

"THE FOLKS WHO KNOW — ARE DEALING WITH "RAMECO"

LOCOMOTIVES

- 1—Jeffrey 121 25" High—Electric Reel
- 1—Goodman 18-30 24" High—Electric Reel
- 1—Goodman 35-8 with Clutch Reel
- 1—Goodman 1000 K 3 Ton—Electric Reel
- 1—Whit 907—18 Ton
- 1—Goodman 32-1-57—8 Ton
- 1—GE—6 Ton
- 1—Jeffrey 88 with Electric Reel
- 1—Jeffrey 98 with Clutch Reel
- 1—Jeffrey 98 with Electric Reel

CONVEYORS

- 1—15" Chain Conveyor—390'
- 4—Joy F-12 Chain Conveyors 220/440 AC
- 3—Goodman 6 12 1/2 Shakers Size 1 or 1 1/2 Pans
- 1—12" Chain Conveyor—DC
- 1—Face Conveyor

CUTTING MACHINES

- 1—Goodman 412
- 2—Goodman 312
- 1—C.B.-1 Bull Ivan with trunks
- 1—Sullivan CR-10 15" High
- 1—Sullivan 11-B
- 1—Jeffrey 33-B 1—35-BB
- 2—Jeffrey 35-L
- 1—Sullivan C-8 with truck
- 1—Standard Goodman
- 1—Goodman 212-AA with truck—229 AC
- 4—Goodman 212-AA with trucks—230 DC

MINE CARS

- 48" Gauge—End Dump 22" Above Rail
- 42" Gauge—End Dump 24" Above Rail
- 42" Gauge—Drop Bottom—Low Vein

MISCELLANEOUS

- 5 to 75 KVA Transformers
- 1—McLanahan 24 by 30 Crusher
- 1—Joy Low Pass Truck
- 1—Air Compressor—Low Vein Truck
- DC Sander—AC Welders
- Trolley Wire & Fittings
- Scrapmobile—Rebuilt
- 2—NKL Hoists
- 1—Sullivan Hoists
- 1—State Larry
- Edison Lamp & Chargers
- Substations 100 to 300 KW
- 1—75 and 1—100 KW Diesel Power Plants
- Mine Pumps & Fans—AC or DC drives
- Complete Tipples with HYDRO-SEPARATOR
- Mine Supplies—Cable—Locomotive Tires
- 5—30 Ton Coal Bins with Steel Structures
- 1—Jeffrey Jig Washer—Complete
- First Aid Supplies
- 200 Rail, Switches—Ties
- Shop Equipment
- Flame Safety Lamp

COME TO SEE US

One Mile from Richlands, Virginia Airport—Elevation 2000 Feet—Runway 1000 Feet

C. T. ADAIR—P.O. Raven, Virginia—Highway 440

Telephone Richlands, Va.—Day, WOODLAWN 1-9356—Night, WOODLAWN 1-9267

Mail us a list of your idle equipment—We may have a home for it

A "Fair Deal" or "No Deal" at "RAMECO"

BANKRUPTCY SALE!

By Order of the United States District Court for the Southern District of Indiana,
Evansville Division, in Bankruptcy Case No. EV58-B-6

COAL MINING MACHINERY & EQUIPMENT

OF THE BANKRUPT

LOGOOTE BLOCK COAL, INC., LOGOOTE, INDIANA

TO BE SOLD 11:00 A.M. (C.D.T.) ON THE PREMISES AT

PUBLIC AUCTION

FRIDAY, SEPTEMBER 12th, 1958

Consisting of:

DRAGLINE: Manitowoc 120 Ft., Model 4500, Speedcrane; Serial No. 4536; Hendrix 6 Yd. Bucket.

SHOVEL: Northwest, Model 700, Diesel Powered Shovel.

TRACTORS: 2—Allis-Chalmers, Model HD 19, Tractors; One with Hydraulic Bulldozer and Other with Cable Controlled Bulldozer.

GRADERS: Allis-Chalmers Motor Grader; Caterpillar Pull Grader.

TIPPLE: Portable Coal Grading Tipple; Stoker Crusher, Washer, Oil Treating and Diesel and Electric Motors.

MISCELLANEOUS: 2—Hough Loaders; Chevrolet, G.M.C., Ford and Dodge Dump Trucks; Test Drilling Units; 1—R Air Compressor; 2", 4" and 6" Pumps; Diesel Engines; Maintenance Trucks and Equipment; Plastic Pipe and Hose; Power Conveyor; Electric Cable; 13 Ton Truck Scale; Metal and Wood Buildings; Surveying Equipment; Electric Motors; Repair Parts; Office Equipment.

Receiver
JOSEPH SINNOTT
WASHINGTON, IND.

Attorney for Receiver
CHARLES SPARENBERGER
EVANSVILLE, IND.

Descriptive Literature Mailed on Request

SAMUEL L. WINTERNITZ & CO.

Auctioneers • Liquidators • Appraisers

FIRST NATIONAL BANK BUILDING • CHICAGO 3, ILLINOIS

LOCOMOTIVES

THE IRONTON ENGINE COMPANY

STORAGE BATTERY — TROLLEY
FARMINGDALE, NEW JERSEY
(Formerly Ironton, Ohio, 1902-1930)



MOTORS • GENERATORS
TRANSFORMERS

NEW • REBUILT

ELECTRIC EQUIPMENT CO.



WRITE FOR LITERATURE
CALL COLLECT GL 3-6783
P.O. BOX 31 • ROCHESTER, N.Y.

POWER EQUIPMENT CO.
Offers

**BARGAIN
PRICES**



ON GUARANTEED
NEW and Rebuilt
MOTORS!

SEPTEMBER SPECIALS

Guaranteed Rebuilt Motors
230 Volt-DC, Compound Wound Unless
Otherwise Noted

HP	Make	Type	Speed
40	Century B. & B. Drip New	DN-375	1800
25	West T.E.F.C.B. XP	SK-83.3	1800
25	G.E.T.E.B. New	CD-77	1800
25	G.E. S.B. Open, Shunt	CD-93	1200
20	West T.E.B. Shunt	SK-83	1800
20	G.E. S.B. Open	CD-85	1200
15	Reliance B.S. Drip, Shunt	46T	1800
15	G.E. S.B. Open	CD-75	1800
7 1/2	G.E. T.E.F.C.B. New	B-294	1800
7 1/2	West T.E.B. Shunt	SK-294	1800
7 1/2	West T.E.B. Shunt	SK-83	1800
7 1/2	L.A. B.S. Open	NA-642	1200
5	Reliance T.E.F.C.B.S.		
	XP New	T-254	1800
5	Century T.E.F.C.B.S.		
	New	DN-294	1800

Send for our FREE Catalog

Cash for your surplus new &
used electric equipment.
Send your list today.

Large line of motors, control equipment, AC
& DC Generators, MG sets and transformers.

Phone or Wire Us Collect



POWER EQUIPMENT CO.

8 Carr St., Rochester 2, N. Y.
Phone BEverly 5-1662

GOOD USED EQUIPMENT FOR SALE

650-B Bucyrus Erie Elec. Drag, 195', 16 yd.
15-W Bucyrus Erie Elec. Drag, 215', 13 yd.
631 Page Elec. Dragline, 200', 8 yd.
9-W Bucyrus Erie Elec. Drag, 200', 8 yd.
625 Page Diesel Drag, 150', 10 yd.
723 Page Diesel Drag, 130', 10 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W Bucyrus Erie Diesel Drag, 125', 6 yd.
7-W Bucyrus Erie Diesel Drag, 180', 5 yd.
5-W Bucyrus Erie Diesel Drag, 120', 6 yd.
2400 Lima Drag, 130', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
3900 Manitowoc Speedcrane, 100' boom
3500 & 3000 Manitowoc Crawler Cranes
750-B Bucyrus Erie 20 yd. Elec. Shovel
5480 Marion 18 yd. Elec. H.L. Shovel
170-B Bucyrus Erie 6 1/2 yd. Elec. Shovel
120-B Bucyrus Erie 4 yd. Elec. Shovel
4500 Manitowoc 5 yd. H.L. Shovel
1400 P&H 4 yd. Elec. Shovel
Large selection of smaller Shovels and Draglines
available

Model T-750 Reich Truck Mounted Rotary and
Down-the-hole Drill
McCarthy & Compton Coal Auger Drills
Euclid Trucks, Truck Cranes, Dozers, Scrapers,
Front End Loaders, Drills, Buckets, Attach-
ments and other misc. equipment available.

FRANK SWABB EQUIPMENT CO., INC.

313 Hazleton Nat'l. Bank Bldg.

Hazleton, Pa. Gladstone 5-3658

Quality Mining Machinery For Sale

CALL US FOR YOUR MINING NEEDS, WHETHER BUYING, SELLING, OR TRADING

Your Confidence Keeps Us In Business
IF WE ADVERTISE IT—WE OWN IT

LOADING MACHINES FOR SALE

- 3-7 BU Joy Loading Machines, 250 Volt, D.C.
- 2-8 BU Joy Loading Machines, 250 Volt, D.C.
- 3-11 BU-10APE Joy Loading Machine.
- 1-11 BU-11APE Joy Loading Machine, 250 Volt, D.C.
- 1-12 BU-7E Joy Loading Machine.
- 2-14 BU-7BE Joy Loading Machines, 250 Volts, D.C.
- 2-12BU 9E Joy Loading Machine, 250 Volts, D.C.
- 2-14BU-3PE Joy Loading Machines, 250 Volts.
- 1-64S Goodman Loading Machine.
- 1-8BU Joy Loader, 220 Volts, A.C.

SHUTTLE CARS FOR SALE

- 1-Jeffrey Shuttle Car, 4-wheel drive and steer.
- 2-65C-3AE Joy Shuttle Cars, fixed elevated discharge, disc brakes, 34" high (Matched Pair).
- 6-65C-5E Joy Shuttle Cars, 250 Volts, D.C., elevating discharge, 4-wheel steering.
- 4-65C-7E Joy Shuttle Cars (Matched Pair), modern having airplane type brakes, adjustable elevating discharge, and solid drive.
- 1-32E9 Joy Shuttle Car, 250 Volt, D.C.
- 2-42E-9 Joy Shuttle Cars, equipped with dual tires and sabla.
- 1-42E-16 Joy Shuttle Car, 250 Volt, D.C.
- 2-571-38 Goodman Shuttle Cars, 250 Volt, D.C.
- 4-105C Joy Shuttle Cars, 4-wheel drive & steer—Modern.
- 4-55C Joy Shuttle Cars, Matched Pair, elevating discharge, disc brakes, 250 Volts, D.C.—Modern.

CUTTING MACHINES FOR SALE

- 6-7B Sullivan (Joy) Cutting Machines, 220/440 Volts, A.C. Excellent Condition.
- 2-7AU Sullivan Cutting Machines, 250 Volts, D.C.
- 3-11RU Joy Cutting Machines, 250 Volts, D.C. with 9" Cincinnati Bar, Chain and bugduster.
- 3-12AA Standard Goodman Machines.
- 3-35B Jeffrey Cutting Machines, 250 Volts, D.C. 8 1/2 ft. cutter bars.
- 6-35BB Jeffrey Cutting Machines, 250 Volts, D.C. 8 1/2 ft. cutter bars.
- 3-31Z Goodman Cutting Machines, 220/440 Volts, A.C. Excellent Condition.
- 1-31Z CCH Goodman Cutter, 250 Volts, D.C.
- 1-31Z DA Goodman Cutters.
- 1-31Z AA Joy Cutting Machine, 250 Volt, D.C.
- 2-10RU Joy Cutting Machines, 250 Volts, D.C. with bugduster.
- 1-124AA Goodman Slabber with one lot of new parts.
- 1-35L Jeffrey Cutting Machine.
- 4-29UC Jeffrey Cutting Machines.

RECTIFIERS FOR SALE

- 1-General Electric, 300 KW, Stationary Rectifiers, 2300/4000/4160 primary and 275 Volts, D.C. secondary. Complete with switching equipment and associated controls. Latest type, like new.

ROTARY CONVERTERS FOR SALE

- 1-150 KW Rotary Converter, Serial No. 1054562, with 150 KVA transformer, number 1512723, and panel boards.

COAL DRILLS FOR SALE

- 2-CD-22 Joy Coal Drills, rubber tire mounted, self-propelled, 250 Volts, D.C.
- 25-CP-472 Electric Coal Drills, 250 Volts, D.C.

CRUSHERS FOR SALE

- 1-Banded Crusher, sizes 24" x 24", complete with 30 H.P. Motor. Like New.
- 1-McLanahan (Bantam Buster) Single Roll Crusher 24" x 48".

MOTOR GENERATORS FOR SALE

- 1-300 KW Westinghouse Motor Generator Set, synchronous motor number 2589701, 433 KW output, 435 KVA, 2200 volts, 113 amp., 1200 RPM, input power factor .8, three phase, 60 cycle D.C. generator number 2589799, 300 KW, 275 volts, 1200 RPM, 1200 amp., S.O. 3813216 compound wound. Complete with D.C. panel and switchgear.
- 1-150 KW Westinghouse Motor Generator Set, 2300 volts A.C., 275 volts D.C. Complete with switching gear.
- 1-50 KW Westinghouse Motor Generator Set, 2300 volts A.C., 275 volts D.C. Complete with switching gear.
- 3-50 KW G.E. Motor Generator Sets, 2300 volts A.C., 275 V., D.C. Complete with switching gear.
- 1-200 KW Ridgeway Motor Generator Set, 900 RPM, complete with manual breaker A.C. and D.C. switchgear, 2300/4000 Volts, A.C., 275 Volts, D.C.
- 1-200 KW Ridgeway Motor Generator Set, complete with switchgear and 1600 amp. I-T-E automatic circuit breaker, 2300 A.C., 275 Volts, D.C.
- 2-200 KW Portable Motor Generator Sets, 2300/4000/4160 A.C. & D.C. Automatic.

LOCOMOTIVES FOR SALE

- 1-10 Ton Goodman Locomotive, Serial No. 4371, type 32AO4-T, 250 Volts 42" track gauge, height 34".
- 2-15 Ton Goodman Locomotives, Anti Friction, Contactors, Air Brakes, Modern.
- 2-10 Ton Goodman Locomotives, Anti Friction, Contactors, Air Brakes, Modern.

ROCK DUSTERS FOR SALE

- 1-MSA Track Mounted Rock Duster, 10 H.P. A.C. or D.C., high pressure, 30" high, any gauge.
- 1-American Mine Door, wheel mounted bantam type rock duster, 250 Volts, D.C., 22" high.
- 2-MSA Bantam Rock Dusters, Rubber Tired, Portable.
- 2-MSA Bantam Rock Dusters, Skid Mounted.

HOISTS FOR SALE

- 1-Brownie Hoist, Model HKM.
- 2-Brownie Hoist, Model HKL.
- 10-311 1/2 Vulcan-Donner Material Hoists, complete with 3 H.P. D.C. Compound wound 1750 RPM General Electric Motor.
- 2-CHD Joy Car Spotting Hoists—Permissible.

CHAIN CONVEYORS FOR SALE

- 6-10 H.P. Long Conveyors, 300 ft. long, complete with head, tail, pans and chains.
- 3-5 H.P. Long Conveyors, 300 ft. long, complete with head, tail, pans and chains.
- 5-61 AM Jeffrey Chain Conveyors, 10 H.P., 300 ft. long.
- 2-61 AM Jeffrey Chain Conveyors, 5 H.P., 60 ft. long.
- 1-500' Long Conveyor Model 4000—Complete with drive, pan and chain.

CAT TRUCKS FOR SALE

- 2-Joy High Pan Cat Trucks, 250 Volt, D.C., rebuilt, T1-3E Type.
- 2-T-1 Joy Cat Trucks A.C.
- 2-T2-6APE Joy Trucks—Permissible.

ELEVATORS FOR SALE

- 2-Barber-Greene self-propelled rubber tired elevators, 30 ft. long, gasoline or electric.
- 2-Barber-Greene self-propelled rubber tired elevators, 30 ft. long, self loading type.
- 2-Joy PL 11-16 Elevating Conveyors.

COMPRESSORS FOR SALE

- 1-WK 85 Joy Air Compressor, rubber tire mounted, self-propelled 28 1/2" high, model 240, maximum pressure 100 pounds.
- 3-Acme Self-Propelled Air Compressors, 83R, Model 148, Capacity 176 C.F.M., with 40 H.P. Alliance Compound Motor.

MISCELLANEOUS FOR SALE

- 15-Wolfe Flame Safety Lamps.
- 1-21" x 15" Electrically magnetized pulley, with Stearns 240 Volts, 40 RPM, 2.7 amp. magnet, driven by 1 H.P. 1730 RPM, 440 Volt Continental motor and speed reducer. Complete with push button control.
- 1-24" Fan with drive.
- 100-AC&F 7 Ton capacity 42" Track Gauge Drop Bottom Mine Cars.
- ROOF BOLTING MACHINES FOR SALE
- 2-Fletcher Roof Bolting Machines, Rubber Tired, Self Propelled.

ALL EQUIPMENT LISTED AND HUNDREDS OF OTHER ITEMS ARE IN STOCK AND MAY BE INSPECTED AT OUR SHOP AND EQUIPMENT YARD LOCATED AT RALEIGH, WEST VIRGINIA

MOUNTAIN STATE EQUIPMENT COMPANY

Box 1050, Beckley, West Virginia

J. J. MAHONEY
Res. Phone CL 3-4804
Beckley, W. Va.

WILLIAM R. MONK
Res. Phone CL 3-6907
Beckley, W. Va.

Phone Clifflord 3-7383

R. E. KAMM
Res. Phone 4281
Summersville, W. Va.

7 yd. PAGE, walker
perfect condition
New Bucket
SERODINO, INC.

8176 Vine St., Cincinnati 16, Ohio
VAlley 1-3161

MINING MACHINES priced for quick sale

- 3-JEFFREY 35-L-permissible 230 volts DC 7 1/2" cutter bar
 - 1-GOODMAN 412-permissible 230 volts DC 6 1/2" cutter bar
 - 2-BULLIVAN 80 combination short wall or long wall-permissible 2 1/2" cutter bar
- BERRETINI ELECTRIC CO.
300 W. Main St., Plains, Pa.
Ph. Wilkes-Barre Valley 25001

20# - 30# - 40#
NEW RAIL IN STOCK
LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

-ADVERTISERS IN THIS ISSUE-

*Indicates more product information may be found in company advertising appearing in COAL AGE 1938 Mid-July Mining Guidebook and Buying Directory Issue. Check your Guidebook Index.

ABC Scale Div. of McDowell Co., Inc. 114	Hamilton Rubber Co. 53	Sinclair Refining Co. 115
Acme Machinery Co. 120	*Hendrick Manufacturing Co. 144	*Spencer Chemical Co. 155
Allis-Chalmers General Products Div. 139	*Heyl & Patterson Inc. 25	Stamler Corp., W. R. 50
Allis-Chalmers Construction Machinery Div. 94-95	International Harvester Co. (Construction Equipment Div.) 109	*Texas Co. 2-3
*Aluminum Co. of America. 90	International Harvester Co. (Payhaulers) 110-111	Timken Roller Bearing Co. 6
*ACF Industries Inc., American Car & Foundry Co. Third Cover	International Harvester Co. (Trucks) 122-123	Tyler Co., W. S. 150
*American Mine Supply Co. 32	Jeffrey Manufacturing Co. 62-63	*Union Switch & Signal Div., Westinghouse Air Brake Co. 138
American Minechem Co. 42	*Joy Manufacturing Co. 10, 22-23, 44	[United States Rubber Co., Mechanical Goods Div. 131
American Oil Co. 135	Kelly Manufacturing Co. 154	*United States Rubber Co., Tire Div. 58
*American Pulverizer Co. 59	Kersey Manufacturing Co. 47	*United States Steel Corp. 124, 141
*American Steel & Wire Div., United States Steel Corp. 40-41, 55, 78-79	Koehring Co. 18-19	*Victaulic Co. of America. 48
Anaconda Wire & Cable Co. 167	Lee-Norse Co. 16-17	Wagner Tractor Inc.
Armstrong-Bray & Co. 58	*Leman Machine Co. 24	Wedge-Wire Corp. 38
Athey Products Corp. 61	LeRoi Div. Westinghouse Air Brake Co. 52	Wickwire Spencer Steel Div., Colorado Fuel & Iron Corp. 44
*Austin Powder Co. 108	*LeTourneau-Westinghouse Co. 89, 91	Youngstown Sheet & Tube Co. 84-85
Barber-Greene Co. 121	*Link-Belt Co. Fourth Cover, 54	
Bethlehem Steel Co. 88, 149, 157	*Long Co. 32, 57	
Bird Machine Co. 4	*Ludlow-Saylor Wire Cloth Co. 118	
*Bowditch Co. 20	Mack Trucks. 14	
Broderick & Bascom Rope Co. 125	*Manitowoc Engineering Co. 159	
Bucyrus-Erie Co. 127	Marietta Concrete Corp. 168	
Cardox Corp. 129	Marion Power Shovel Co. 49	
Caterpillar Tractor Co. 64-65	*McLanahan & Stone Corp. 51	
*Centrifugal & Mechanical Industries, Inc. 21	*McNally Pittsburg Manufacturing Co. 140	
Coal Age. 101, 102-103, 104	Metallurgical Products Div., General Electric Co. 151	
*Colliery Insulated Wire Co. 158	*Mine Safety Appliances Co. Second Cover	
*Compton Inc. 15	National Mine Service Co. 60	
Continental Gin Co. 46	National Tube Div., United States Steel Corp. 105	
*Denver Equipment Co. 56	Neff & Fry Co. 56	
Differential Steel Car Co. 152	New York Rubber Co. 100	
*Dravo Corp. 77	*Nolan Co. 154	
*Duff-Norton Co. 39	Ohio Brass Co. 33, 34-35, 36	
duPont de Nemours & Co., E. I. (Explosives Div.) 153	Okonite Co. 147	
Ensign-Bickford Co. 68	Old Republic Insurance Co. 67	
Euclid Div., General Motors. 145	Paris Manufacturing Co. 156	
*Exide Industrial Div., Electric Storage Battery Co. 146	*Porter Co., Inc., H. K. Quaker Rubber Div. 143	
*Fairmont Machinery Co. 43	Leschen Wire Rope Div. 142	
Firestone Tire & Rubber Co. 133	Post-Glover Electric Co. 148	
Fletcher & Co., J. H. 66	Roebbling Sons Corp., John A. 160	
Flexible Steel Lacing Co. 58	*Salem Tool Co. 8	
*Flood City Brass & Electric Co. 97	Sanford-Day Iron Works. 12-13	
Fuller Manufacturing Co. 119	*Scandinavia Belting Co. 45	
General Electric Co. 83	Schroeder Bros. Corp. 54	
Goodman Manufacturing Co. 29	Searchlight Section. 161-165	
Goodrich Industrial Products Co., B. F. 1	Simplex Wire & Cable Co. 31	
Goodrich Tire Co., Div. B. F. Goodrich Co. 137		
Guyana Machinery Co. 144		

PROFESSIONAL SERVICES

161

CLASSIFIED ADVERTISING

F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES

161

SPECIAL SERVICES

161

NOTICES

Auction. 164

EQUIPMENT

(Used or Surplus New)

For Sale. 161-165

WANTED

Equipment. 161

ADVERTISING SALES STAFF

Atlanta 3 ... M. H. Miller, 1301 Rhodes-Haverty Bldg., Jackson 2-0951
 Chicago 11 ... G. A. Mack, F. W. Roets, 530 N. Michigan Ave., Mohawk 4-5690
 Cleveland 19 ... J. E. Lange, 85 Public Square, Superior 1-7699
 Dallas 1 ... P. E. Holland, 1712 Commerce St., Riverside 7-3521
 Denver 2 ... J. W. Patten, Milo High Center, 1746 Broadway, Alpine 5-2981
 Los Angeles 17 ... J. B. Uphoff, 1123 W. 6th St., Madison 6-9351
 New York 36 ... H. C. Chellom, R. Peckham 589 5th Ave., Oxford 5-5959
 Pittsburgh 22 ... Wm. H. H. Glinder, 1111 Oliver Bldg., Atlantic 1-4795
 Philadelphia 3 ... J. B. Lewis, 6 Penn Center Plaza, Philadelphia 3, Locust 9-4339
 St. Louis 8 ... F. W. Roets, Continental Bldg., 3615 Olive St., Jefferson 5-4867
 San Francisco 4 ... J. W. Otterson, 69 Post St., Douglas 2-4698
 Europe ... B. E. Schirmer, McGraw-Hill House, 95 Farringdon St., London E. C. 4, England
 Michael R. Zarnel, 15, Landgraf-Wilhelm, Frankfurt-Main, Germany



Figure the true cost of cable—and you'll see why Anaconda Shuttle Car Cable costs you less!

The cost of your shuttle car cable includes more than just its original price. For example . . .

A shuttle car cable failure slows down all production in a section—involving perhaps a quarter of a million dollars' worth of equipment—for the 20 to 30 minutes it takes to find and make the repair. Each failure means a loss of approximately \$90 on top of this—for materials, direct labor, etc.

And at \$90 each it takes only a few failures to add up to the cost of a new cable!

According to one company's records the failure of other brands of shuttle car cable was *six times*

greater than for Anaconda cable—during the same period of time and under the same working conditions.

WHICH CABLE COSTS LESS?

The Man from Anaconda, or your Anaconda distributor will be glad to work with you to lower the cost of shuttle car cable failures in your mine. See him today. Write for new Bulletin DM-5815, Anaconda Securityflex Portable Cables for the Mining Industry, Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

DM521



SEE YOUR **ANACONDA®** DISTRIBUTOR
FOR **SHUTTLE CAR CABLE**

MARIETTA

off-the-ground
storage systems lower
coal handling costs...
stop losses...
save space



Keeping coal in open storage piles is risky and costly business. Rugged Marietta concrete storage silos take up much less space, keep all the coal clean, safe, dry and ready for immediate use.

Design flexibility of Marietta silos makes it possible to adapt them to any capacity needs... any filling or discharge methods, at a lower cost than other types of tanks, bins or bunkers. Floors may be sloped for gravity discharge out the bottom or side and silos may be built over tunnels for conveying equipment. Elevator, conveyor, or other essential equipment, may be mounted inside, outside or on top of the silo.

Marietta's technical know-how and broad experience in solving many coal handling problems can benefit you. Let a qualified representative survey your storage needs and show you how a Marietta system can reduce losses and handling costs, lower insurance, lessen fire hazards, and improve overall appearance.

Write for this service and a copy of Marietta's Modern Industrial Storage Systems booklet.

THE

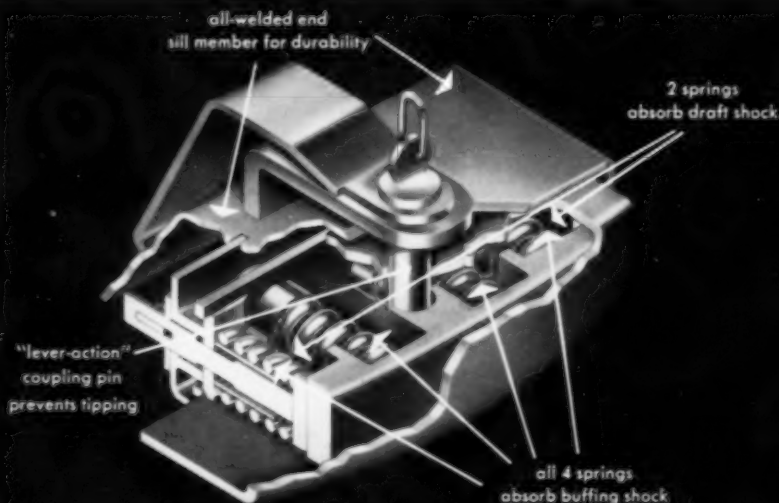
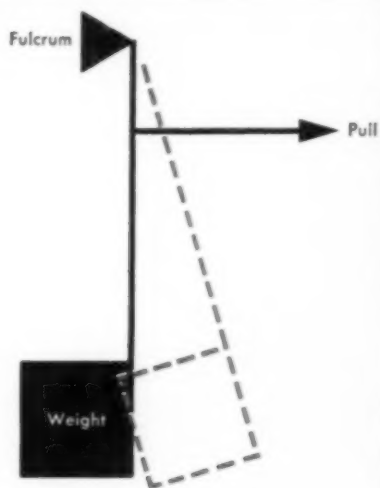
Marietta CONCRETE CORPORATION Marietta, Ohio

BRANCH OFFICES: 501 Fifth Ave., New York 17, N. Y., Pulaski Hwy. at Race Rd., Baltimore 21, Md., 411 Foster St., Charlotte 6, N. C., Box 592, Jamestown, N. Y., Nashville, Tenn., Box 5192.

42 YEARS KNOW-HOW IN PRECAST CONCRETE CONSTRUCTION

SHOCK

TAKE THE **SHOCK** OUT OF
YOUR MINE CAR TRIPS!



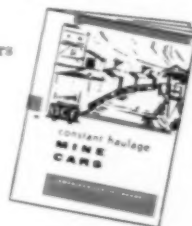
acf HEAVY DUTY DOUBLE-ACTION SPRING BUMPER

- ✓ Permits starting and hauling longer car trips!
- ✓ Extends car life, lowers maintenance and repair costs!
- ✓ Cannot tip, flatten or crush under severe draft or buffing force!
- ✓ Proved in fifteen years of service on thousands of cars!

ACF's exclusive spring bumper assembly soaks up draft and buffing shocks with ease, adds years of trouble-free life to mine car structure even in the hardest service! No other "shock absorber" works as well. Available on all sizes and types of ACF mine cars: end dump, rotary dump, or drop bottom. Fits neatly into the

exclusive ACF all-welded end sill member. Spring sizes varied to suit car design and capacity. A representative will be glad to explain the advantages and engineering features of the time-proven ACF Double-Action Spring Bumper. Get in touch with your nearest ACF sales office, or write Dept. CA-9 in New York.

Bulletin describing all types of ACF Mine Cars available on request.



acf

AMERICAN CAR AND FOUNDRY

DIVISION OF ACF INDUSTRIES, INCORPORATED
750 THIRD AVENUE, NEW YORK 17, N. Y.

**MINE CARS FOR
CONSTANT HAULAGE**

SALES OFFICES: New York • Chicago • Cleveland • Washington, D. C. • Philadelphia • San Francisco • St. Louis • Berwick, Pa. • Huntington, W. Va.

Cut costs in coal preparation



Clinchfield Coal Co., Moss No. 3, Carbo, Va.
(now under construction)



Clinchfield Coal Co., Moss No. 2, Clinchfield, Va.



Joanne Coal Company, Rachel, W. Va.

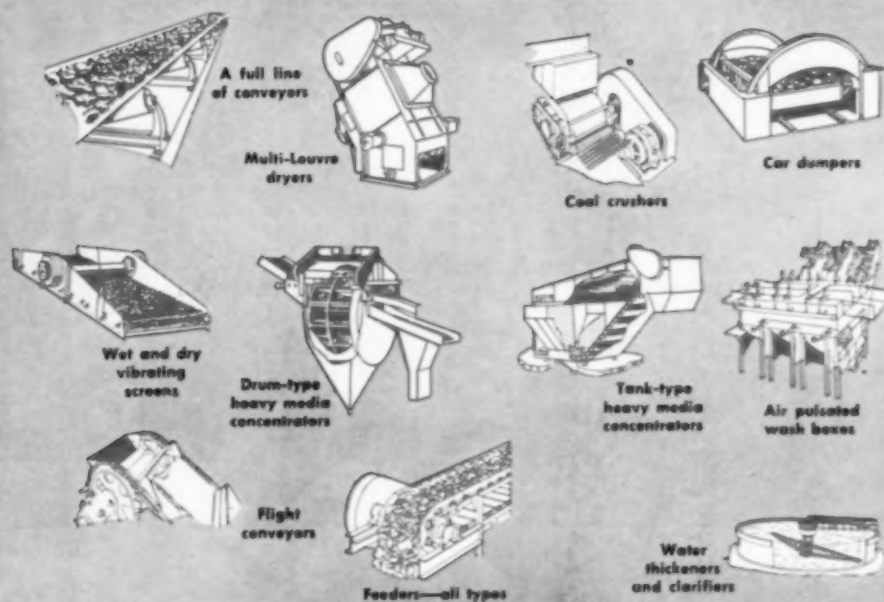


Pocahontas Fuel Co., Itmann, W. Va.



Inland Steel Co., Price, Ky.

National Mines Corp., Isabella, Pa.



**Link-Belt offers one source for
complete plants
individual components**

The complete coal preparation plants at right are working proof of Link-Belt's ability to provide low-cost handling and processing to suit every seam and market requirement.

With over 60 years' experience and a complete line of equipment, Link-Belt is in a unique position to fulfill all your needs. We'll completely design, equip and erect coal preparation facilities. Or, if

there is need for modernizing your present installation, Link-Belt can supply individual units engineered to bring new economy and efficiency to your operation.

Take advantage of this experience by calling your nearest Link-Belt office for an obligation-free analysis of your specific needs. Ask for our new 36-page coal preparation book 2655, showing Link-Belt equipment for coal preparation.

LINK-BELT

COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Birmingham 3, Cleveland 20, Denver 2, Detroit 4, Huntington 9, W. Va., Indianapolis 6, Kansas City 8, Mo., Louisville 2, Pittsburgh 13, Seattle 4, St. Louis 1. To Serve Industry There are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

14,917